ASSESSMENT OF THE HEALTH IMPACTS OF LOWERING THE MINIMUM LEGAL AGE FOR PURCHASING ALCOHOL IN NEW ZEALAND

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1. EXECUTIVE SUMMARY

1.1 Introduction

This report aims to provide the Associate Minister of Health responsible for alcohol and drugs, Hon Tariana Turia, with as much relevant information as possible about the health impacts of the lowering of the minimum legal age for purchasing alcohol from which base to consider future policy options and interventions. The report is a first step by the Alcohol Advisory Council (ALAC) to estimate the health impacts of the lowering of the legal age at which people can legally purchase alcohol in New Zealand from age 20 to age 18, which was made via the Sale of Liquor Amendment Act 1999.

Problematic alcohol consumption by young people in New Zealand did not begin with the lowering of the age of legal purchase. Youth drinking has been concerning policy-makers, parents, teachers, treatment and public health service providers alike for a number of years. The problems with young people's alcohol consumption have not remained static. As alcohol becomes more accessible to young people (both minors and youthful legal purchasers of alcohol), levels and rates of harm increase, and hazardous consumption and harm trends extend to younger age groups who learn hazardous drinking patterns and behaviours from older peers and from adults.

The task of accurately assessing the effects of the legislative change is extremely difficult at this time due to the lack of data relevant to the time period assessed (due to data analysis and dissemination delay), a lack of high quality data, and insufficient statistical power. This soon after the legislative change there is little high quality New Zealand benchmarking data available for the year 2000 onward. Therefore, extrapolating from overseas findings is probably the most accurate way in which the impacts of the legislative change can be estimated at this time. However, this report focuses on ALAC's use of the available evidence and trend data to attempt to measure impacts; it does not detail why the health impacts of the legislative change cannot easily be directly assessed this soon after the introduction of the legislative change.

A report detailing why an accurate health impact assessment cannot be achieved relying more strongly on New Zealand data at this time would likely facilitate critical thinking about what is required in the future so that longer-term impacts can be estimated and shorter-term impacts identified more easily with greater hindsight. However, that was not the brief for this assessment.

Given the time frame for this study and the data limitations identified, the study focuses mainly on the health impacts of the legislative change on 18–19 year olds and provides a hypothesis for the impact upon that age bracket only. Given that one argument against the change in legislation was that the thresholds for underage purchase would simply shift down the age spectrum subsequent to the change in legislation, ALAC suggests that the impact on 15–17 year olds could be a primary focus for further study in the future.

1.2 Methodology

This report reveals a lack of data from which to draw conclusions about the health impacts in question. For this reason, the approach taken to the task (and the limitations of this approach) is an important factor to consider prior to examining the estimated impacts.

This report has used four key elements of the Ministry of Health's full health impact assessment model.

- Scoping of issues;
- Statistical profiling and trend analysis (collation of baseline or benchmarking data);
- Risk assessment including:
  - A review of economic modelling of overseas experts; and
  - The application of overseas evidence to the New Zealand situation to estimate the impacts of the lowered purchase age in New Zealand;
- Risk management: consideration of alternative policy interventions and their effectiveness (MOH 1998a).

Despite some differences in social norms, policy settings and cultural practices, it is likely that the similarities in target alcohol-related problems in New Zealand are similar to those in the US, Canada and Australia. Therefore, applying overseas studies to New Zealand situations is generally appropriate. The limitations relating to applying overseas evidence to the New Zealand situation are discussed in section 4.3 of this report.

1.3 Definitions

For the purpose of this report, the terms 'minimum legal drinking age' or 'the drinking age' are applied to the US setting, where, in most jurisdictions, people below the drinking age are not permitted to purchase or consume alcohol. As the recent law change in New Zealand affects only the purchase of alcohol, and this report uses the terms 'minimum legal age for purchasing alcohol' or 'the purchase age' to refer to the New Zealand setting.

The terms 'alcohol abuse' and 'alcohol dependence' are used throughout this report. Definitions of alcohol abuse and alcohol dependence used in this study were sourced from the *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV* (APA 1994). These definitions are provided in Annex 1.

1.4 Benchmarking: New Zealand Trends

In many cases, trends in drinking patterns and drinking effects are not obvious from comparing pre- and post-1999 data. Where trends can be seen, they may be confounded by other factors such as economic growth, real increases in income, unemployment trends for young people, numbers and proportions leaving school, parental and peer influences, population effects and so on. Where the number of negative outcomes for young people is trending down, this does not necessarily mean that the lowered purchase age has had no consequences. Without robust

multivariate analysis, it is difficult to know whether the trends are associated with a lower purchase age or are the result of other factors.

New Zealand benchmarking trend data in relation to health outcomes is not always available, and New Zealand data that links alcohol with negative outcomes is not always available. This is confounded by the lack of a standard alcohol indicator on national morbidity and mortality data. In addition, ethnicity data, particularly that relating to Mäori and Pacific peoples, is not always available in relation to alcohol use and health outcomes.

1.4.1 General Trends

Statistics from a variety of sources show that, in general, young people who do drink are drinking more heavily, more often, and are beginning to drink at an earlier age than in 1996/97. A demographic profile of young people who drink is provided in Annex 2.

A broad range of adverse health outcomes for young people appear to have trended upward over the 1995–2000 period. However, data relating to vehicle injuries and ACC statistics show that vehicle crashes for young people aged 14–19 and 20– 24 years have trended downward since 1996.

Males and females in the age group examined (15–19) show differing risk profiles. Young males are over-represented in alcohol-related traffic accident statistics together with other morbidity statistics, such as suicides and falls. Young females are most at risk of the outcomes of unsafe sex while under the influence of alcohol, alcohol-related violent assaults, and suicide attempts or self-harm.

1.4.2 New Zealand Mäori Trends

Overall, a lower proportion of Mäori drink compared with non-Mäori. However, young Mäori (compared with all non-Mäori and with Mäori aged 30 years and over) appear to disproportionately engage in heavier and riskier drinking.

Young Mäori are disproportionately represented in statistics relating to negative outcomes that have some association with alcohol use, abuse and dependence. Mäori are over-represented in available data on adverse youth health outcomes including suicide, homicide, teenage births, admissions into mental health residential facilities for alcohol-related disorders, death and injury from motor-vehicle accidents and from alcohol-related fires and falls.

1.4.3 Trends for New Zealand Pacific Peoples

Suicides and injuries from motor vehicle crashes are the leading causes of death from injury among Pacific peoples. Sports injuries are the most significant cause of hospitalisation for young Pacific peoples aged 15–24 years, followed by assaults and falls.

1.5 International Evidence

Most international studies conclude that the younger the onset of drinking, the more likely are short-term adverse outcomes such as injuries, fatalities, and unsafe sex. Numerous multivariate studies show a direct causal link between a lowered drinking age and increased fatalities and injuries from motor vehicle crashes, together with increased numbers of deaths by suicide. Most studies also appear to show that the younger the age of onset of drinking, the more likely it is that longer-term adverse outcomes could arise, such as alcohol dependence and abuse, and alcohol-related medical conditions.

1.6 Risk Assessment: Health Impact Assessment Results

Based on overseas empirical evidence, New Zealand benchmarking data, and assumptions taken at the median, the first round per annum health impacts and costs (i.e. excluding longer-term impacts and ongoing costs) associated with lowering the legal alcohol purchasing age in New Zealand in 1999 from 20 to 18 are estimated to be:

- Sixteen deaths of 18 and 19 year-olds in the calendar year 2000, at a cost of $41.940 million[1].
- One hundred and forty five non-fatal, harmful outcomes from adverse health events in the year 2000, at a cost of between about $1.604 million and $8.505 million depending on the severity of the injuries.[2]

The full range of estimated health impacts and costs is outlined in Annex 3. The assumptions and equations on which these estimates are based are outlined in Annex 4, and the data forming the basis of these assumptions and equations are discussed more fully in the body of this report.

A range of impacts have not been estimated due to a lack of relevant New Zealand data, including:

- Some first round effects such as teenage births, sexually transmitted diseases, abortions, sexual harassment, and mental health.
- Longer-term health and economic effects such as fetal alcohol effects, loss of opportunity due to an earlier age of onset, increased alcohol abuse and dependence associated with an earlier age of onset, and the ongoing costs to society of vehicle injuries and teenage births.

Therefore, the estimates of deaths and non-fatal adverse events/outcomes and associated costs given above are likely to be under-estimates of the overall harm.

1.7 Risk Management: Alternative Policy Interventions

International evidence shows a number of policies to be particularly effective in reducing alcohol-related harm among young people. New Zealand already has in place a graduated driver licensing system and a lower level of legal maximum blood alcohol content (BAC) for young

[1] Based on the LTSA's estimates of the costs of a statistical life and associated medical costs.

[2] Including vehicle-related, non-traffic, and suicide attempt/self-harm injuries. Excluding any ongoing injury-associated costs.

drivers. It uses the alcohol excise tax and the hypothecated tax as ways to adjust alcohol prices. These controls are balanced against competition and economic imperatives. The two other key policy initiatives shown to be effective are increasing the purchase or drinking age and policing and enforcement of drinking laws. Many of these policy initiatives offer room for consideration.

2. INTRODUCTION

This report attempts to estimate the health impacts of the legislative change that lowered the minimum legal age at which people may purchase alcohol in New Zealand from 20 to 18 years via the Sale of Liquor Amendment Act 1999.

New Zealand trends in youth drinking, associated behaviours, and alcohol-related health impacts (data permitting) are summarised in the report. While trends are useful, they are unable in themselves to provide statistically significant estimates of the impacts of the lowered purchase age. The most robust method for obtaining such estimates would involve controlling for environmental, economic, family, schooling, and population changes among other factors. Time and resource constraints have ruled out that exercise for this report.

This report uses overseas evidence as a guide for estimating the possible impacts and costs of the legislative change in New Zealand. The report should be viewed as a first step in assessing those impacts and costs, and these are indicative only. The possible limitations of applying overseas evidence to the New Zealand situation are discussed in section 4.3 of this report. Potential longer-term impacts are not estimated due to a lack of empirical causal evidence relating to some harms. Gaps in available data are identified and some suggestions made as to how to address similar or recurring data availability problems in the future.

Annex 1 provides the comprehensive definitions of alcohol dependence and abuse upon which the terminology in this report was based. Annex 2 provides a demographic profile of young drinkers aged 18 and 19 years drawn from the Youth and Alcohol Drinking Monitors commissioned by ALAC. Annex 3 provides a full range of estimates for the health impacts and costs of the legislative change. Assumptions used for the impact assessment are included in Annex 4.

3. BACKGROUND

3.1 The Alcohol Advisory Council's Interest in Reducing Alcohol-Related Harm

The Alcohol Advisory Council of New Zealand – Kaunihera Whakatupato Waipiro o Aotearoa (ALAC) was established in 1976 under its original name, the Alcoholic Liquor Advisory Council, following a report by a Royal Commission of Inquiry into the Sale of Liquor. The Commission recommended the establishment of a permanent council, the aim of which would be to encourage moderation in the use of alcohol and to minimise misuse of alcohol.

ALAC is governed by the Alcohol Advisory Council Act 1976. The Act has been amended eight times since assent was first given. The most recent amendment, the Alcohol Advisory Council

Amendment Act 2000, commenced on 20 August 2000 and officially changed ALAC's title to the Alcohol Advisory Council of New Zealand – Kaunihera Whakatupato Waipiro o Aotearoa. The 2000 Amendments also changed the constitution of ALAC's governing body, primary objective, and core functions.

The Council currently comprises eight members. The Council is supported by a twenty-two staff Secretariat based in the national office in Wellington and regional offices in Auckland, Wellington and Christchurch. The national office shares its premises with the central regional office (Wellington). The Chief Executive Officer has responsibility for overall management and operations.

ALAC reports to Parliament through the Associate Minister of Health, Hon Tariana Turia, who is responsible for the alcohol and drug portfolio.

Since 1992, ALAC has operated as a crown entity under the Public Finance Act 1989. The Council is funded by a fixed levy on all alcohol produced for consumption in New Zealand. The levy ensures that funds are targeted at alcohol-related problems and reflects the Government's desire to both address the consequences of alcohol misuse and promote safe drinking habits.

New Zealand is one of the few countries internationally that supports this method of funding whereby the user pays and provides funding for an independent body specialising in alcohol policy, research and programmes aimed at reducing alcohol-related harm and encouraging moderation in the use of alcohol.

The primary objective of the Council is the encouragement and promotion of moderation in the use of alcohol, the discouragement and reduction of the misuse of alcohol, and the minimisation of the personal, social, and economic harm resulting from the misuse of alcohol.

Government has defined ALAC's core functions as being:

- Encouragement, promotion, sponsorship, and co-operation in alcohol-related research;
- Dissemination of information relating to problems of alcohol misuse;
- Development, promotion, implementation and support of educational programmes;
- Sponsorship of innovative programmes for treatment, care, and rehabilitation;
- Provision of policy advice and recommendations to the Government, public and private sectors;
- Monitor and make recommendations on the advertising of alcohol.

At the time that this report was being written, ALAC was in the process of developing its Strategic Plan for the 2002–2007 financial years. The draft Strategic Plan that was released for discussion at that time proposed to focus on three key populations who experience disproportionate alcohol-related harm in New Zealand: young people, Mäori, and Pacific peoples.

ALAC has a strong interest in the health and wellbeing of New Zealand young people, and this interest provides the foundation for its attention to the impacts of the lowered purchase age on the health of young people.

3.2 The Origins of this Report

The age at which people can legally purchase alcohol in New Zealand was lowered in December 1999 from 20 years to 18 years by an amendment to the Sale of Liquor Act 1989 (sections 155–164) via the Sale of Liquor Amendment Act 1999. Subsequent to the enactment of that amendment, anecdotal evidence and ALAC's Youth and Alcohol Drinking Monitors have indicated that there may have been an increase in alcohol consumption by some population groups, particularly those under the age of 18, with a consequential increase in alcohol-related harm.

The Ministry of Justice is the lead agency responsible for the administration of the Sale of Liquor Act 1989. In 2001, the Minister of Justice indicated that a wider review of the impacts of the 199 Amendments was due for completion in the first half of 2002. Following that announcement, the Associate Minister of Health, Hon Tariana Turia, asked ALAC for a health impact assessment of the lowered purchase age to complement the Ministry of Justice's review, which was being drafted at the time.

4. METHODOLOGY

4.1 Health Impact Assessment Models

Health impact assessment has been described in New Zealand as a "combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population." (Signal and Durham 2000)

Health impact assessments tend to be carried out before the introduction of an intervention, often in the problem definition phase of policy development, rather than subsequent to its introduction (Signal and Durham 2000; Ison 2000). The goal of a health impact assessment is generally to contribute to policy advice that is well grounded in the best available evidence. Health impact assessments focus on identifying outcomes.

Full health impact assessments generally take at least six months, with approximately a further six months to write up (Signal and Durham 2000). Various models have been developed in the UK (the Merseyside Model), Europe (the Swedish County Councils Model, the German Bielefeld Model), Canada (the British Columbia Checklist), Australia, and New Zealand (the Ministry of Health Model) (Ison 2000).

The New Zealand Ministry of Health's full health impact assessment model, developed in 1994, is based on the key elements of international models and comprises seven stages:

a) Scoping: What issues must be addressed in the health impact assessment?
b) Baseline information: What is the current health status of the affected population?
c) Risk assessment: What are the risks and benefits? Who will be affected, how, and to what extent?
d) Risk communication: How can issues be best communicated and to which audiences?
e) Risk Management: How can the risks associated with the proposed intervention be avoided or minimised?
f) Decision-making: Is there adequate information for decision-making?
g) Monitoring: Are the expected impacts of the intervention observable? Did the risk-reduction policy measures show an impact? (MOH 1998a).

4.2 Health Impact Assessment Tools

A full health impact assessment is multi-disciplinary and can use many formal tools to achieve its goals including:

- Epidemiology.[3]
- Economic modelling.
- Statistical profiling and trend analysis.
- Testing of alternative options.
- Public consultation (Signal and Durham 2000).

Rapid appraisal and health impact reviews are tools that are used to undertake a quicker Health Impact Assessment (Signal and Durham 2000).

- Rapid appraisal: This approach taps into assessments of impacts made by experts and representatives of those affected (or likely to be affected) by the policy or proposal. This approach is described as resulting in an exchange of existing knowledge rather than the generation of new knowledge;
- Health impact review: This is used where it is not possible to disaggregate the precise impact of various parts of a cluster of policies, but it is possible to create a convincing summary estimation.

4.3 Approach Used and its Limitations

The approach taken in this report is to use aspects of the rapid appraisal and health impact review tools, combined with statistical profiling, trend analysis, use of existing economic modelling, and consideration of alternative options based on existing studies. Four of the seven stages of the Ministry of Health's full impact assessment approach (MOH 1998a) are reflected in the report:

a) Scoping of issues

[3] The study of the relationships of various factors that determine the frequency and distribution of human diseases.

Issues relate largely to the difficulties associated with a health impact assessment of the lowered purchase age due to:

- Insufficient benchmarking data in New Zealand on outcomes caused by alcohol consumption;
- Limitations of applying overseas multivariate evidence of causal links relating to the age of the evidence and the comparability or otherwise of the social and cultural norms and policy settings of countries from which studies are sourced;
- A lack of overseas multivariate studies on the longer-term impacts of lowered purchase ages.

Without this and without more years of appropriate data, the longer-term effects of the lowered purchase age can only be guessed at.

b) Statistical profiling and trend analysis (collation of baseline information)

As far as possible, statistics on youth alcohol drinking prevalence, outcomes and comparisons with overseas trends are used in this report. In many cases, data series from pre-1999 to post-1999 are either not kept or are not up-to-date. Data on behavioural outcomes are not always linked to alcohol. Ethnicity data are not always collated.

c) Risk assessment

Rapid appraisal and health impact review are used to examine the published assessments of experts and their economic modelling approaches. Most studies used in the report are sourced from overseas, particularly the US, Australia and Canada.

Overseas evidence is applied to the New Zealand situation in an attempt to assess the impacts of the lowered purchase age. For example, where US studies find an increase in motor vehicle fatalities resulting from a lowered purchase age (controlling for other factors), the median of that result is used to estimate the possible increase in such fatalities among 18 and 19 year olds in New Zealand. Further estimates and impact and costing assumptions are included in Annexes 3 and 4.

d) Risk management

Applying overseas evidence to the New Zealand situation has its limitations. Most of the robust studies that demonstrate a causal link between lowering the drinking age and immediate health outcomes for young people are sourced from the US, Canada and Australia.

The effectiveness of alternative policy interventions, based on overseas and some New Zealand evidence, is discussed briefly. There are a number of differences between the policy settings in New Zealand and in the countries in which the major studies of the minimum legal purchase or drinking ages are based.

- Policy settings regarding minimum legal ages (for alcohol consumption or purchase) differ internationally. For example, the US legislates for a minimum legal drinking age that makes it illegal to consume alcohol if a person is younger than 21 years of age, whereas New

Zealand and Australia legislate for a minimum purchase age. How the purchase age is defined and enforced differs between Australia and New Zealand. New Zealand minors are able to be supplied alcohol by their parents or guardians in a public setting and may be served alcohol at a private social function by someone other than their parents or guardians. This is not the case in Australia.

- Many of the US studies were carried out in the 1970s and early 1980s following the lowering of the drinking age. New Zealand's social norms relating to alcohol and youth drinking now differ somewhat from the social norms in the US in the 1970s and 1980s. However, ALAC considers that there are enough similarities to enable useful and relevant comparisons between the US data and current New Zealand benchmarking data.
- The US does not have compulsory breath testing, whereas New Zealand does. Despite this, the US and New Zealand are more similar in their proportion of road deaths per 100,000 population than are New Zealand and Australia.

New Zealand is more similar to the US, Australia and Canada than to some other OECD countries in its alcohol-related policy settings, drinking cultures and alcohol-related health consequences for young people. There are more similarities than differences between New Zealand and the US on the issue of youth alcohol-related motor vehicle injuries, and, like the US, New Zealand has high youth suicide rates and high teenage birth rates. There is also consistency in the impacts of lowered minimum legal drinking and purchase ages in Canada and Australia. All countries from which studies were sourced are concerned about the increasing trend for the onset of drinking to occur before the age of 14 years for a proportion of the population.

4.4 Information Sources

Studies used were sourced through nine literature searches that focused on the impacts of lowering drinking ages, alcohol and youth, alcohol-related injuries, alcohol and health impacts, alcohol and falls, alcohol and sport, drink-driving, and alcohol and crime. Relevant studies were chosen based on abstracts and the relevancy of literature search findings in order to exclude less relevant, less robust, older, and less detailed studies.[4] All studies used in this report are referenced in the bibliography.

New Zealand alcohol-related statistics were sourced from hard-copy publications, relevant websites and directly from relevant agencies. Some statistics are currently not available (for example, non-residential mental health data relating to young people and alcohol, sexual harassment data, and age-relevant data on fetal alcohol syndrome). In other cases, statistics are only available to 1999 or 2000. This limits the report's capacity to assess whether trends in alcohol use and related harm changed significantly following the 1999 lowering of the legal purchase age where only one year of out-data is available.

Costs associated with various injuries and health impacts are drawn from a number of agencies including the Land Transport Safety Authority (LTSA), the New Zealand Health Information Service (NZHIS), Statistics New Zealand, District Health Boards, ACC, and the (former) Ministry of Social Policy.

[4] Higher quality studies were chosen over lower quality, more recent (1980s–2000s) over less recent (1960–1970s), etc.

4.5 Outside the Brief of this Report

A number of aspects of a full health impact assessment have not been undertaken in the course of this health impact assessment. This is largely due to the ex-post nature of this health impact assessment, the tight timeframe for the assessment, and insufficient benchmarking data. In addition, ALAC used a minimum of justice data in order not to duplicate material covered by the report that the Ministry of Justice was undertaking at the time. This fits with the nature of ALAC's brief, which was to provide a health impact assessment rather than a social impact assessment.

Aspects not considered or considered in less detail in this report include:

- Risk communication;
- Decision-making (i.e. the role that this work has in the policy development process);
- Monitoring;
- Public consultation;
- Bivariate or multivariate analysis that would isolate the impacts of the lowered purchase age by controlling for a range of other factors;
- Cost-benefit analysis;
- Impacts wider than health (for example, crime and justice issues are briefly touched upon where they overlap with health indicators);
- Longer-term health and economic effects (for example, fetal alcohol effects, loss of opportunity due to an earlier age of drinking onset, increased alcohol abuse and dependence associated with an earlier age of drinking onset, and the ongoing costs to society of vehicle injuries and teenage births);
- The health impacts of the lowering of the purchase age on 15–17 year olds (although this report focuses primarily on the health impacts of the lowering of the purchase age on 18–19 year olds, ALAC suggests that impacts on 15–17 year olds might be an excellent primary focus for further future research);
- The reasons that the health impacts of the legislative change cannot easily be directly assessed at this time (instead, the report focuses on the use of the available evidence and trend data to attempt to measure health impacts).

5. BENCHMARKING: NEW ZEALAND EXPERIENCES WITH YOUTH DRINKING

5.1 Overview

This section reviews relevant statistical data available in New Zealand. In many cases trends in drinking patterns and drinking effects are not observed comparing pre- and post-1999 changes to the purchase age. Where trends can be seen, they are not statistically significant because other factors are not controlled for (such as economic growth, real increases in income, unemployment trends for young people, numbers and proportions leaving school, parental and peer influences,

population effects and so on). Without robust multivariate analysis, it is difficult to know whether the trends are associated with a lower purchase age or are the result of other factors.

Where the number of negative outcomes for young people is trending down, this does not necessarily mean that the lowered purchase age has had no negative consequences. Such trends downwards might have been caused by negative outcomes for other age groups trending upward, meaning that young people have become a smaller proportion of that total statistical population. It may also reflect changes to the way statistics were gathered over the time period. It is, therefore, not possible to say whether or not a trend would have been more or less marked in the absence of the lowering of the purchase age.

While the proportion of drinkers in the New Zealand population remained fairly steady during the 1990s (at between 85 and 88 percent), the proportion of 14 to 19 year old drinkers fluctuated. The proportion of this age group drinking fell from 82 percent in 1990 to 66 percent in 1996. This trend was reversed during the period 1996 to 1999 with the proportion of 14–19 year old drinkers rising again to 77 percent (New Zealand Health Information Service 2001b based on Casswell and Bhatta 2001). While these statistics may not be truly representative of New Zealand as they are sourced from an annual Auckland alcohol survey, national surveys carried out in 1995 and 2000 do appear to reinforce these conclusions (Habgood et al 2001).

ALAC surveys youth drinking prevalence (among other things) through its annual Youth and Alcohol Drinking Monitors. The Monitors show that, in general, young people who do drink are drinking more heavily, more often, and are beginning to drink at an earlier age.

A broad range of adverse health outcomes for young people appear to have trended upward over the 1995–2000 period. However, data relating to vehicle injuries and ACC statistics show that vehicle crashes for young people aged 14–19 and 20–24 years are trending downward.

Overall, a lower proportion of Mäori drink compared with non-Mäori (New Zealand Health Information Service 2001b). However, young Mäori (compared with all non-Mäori and compared with Mäori aged 30 years and over) appear to disproportionately engage in heavier and riskier drinking.[5]

Young Mäori are disproportionately represented in statistics relating to negative outcomes that have some association with alcohol use, abuse and dependence. Mäori are over-represented in available data on youth outcomes including suicide, homicide, teenage births, admissions into mental health residential facilities for alcohol-related disorders, death and injury from motor vehicle accidents and from alcohol-related fires, and falls.

Suicides and injuries from motor vehicle crashes are the leading causes of death from injury among Pacific peoples. Sports injuries are the most significant cause of hospitalisation for young Pacific peoples aged 15–24 years, followed by assaults and falls.

[5] Risky or heavy drinking is defined in the Youth and Alcohol Drinking Monitors as at least 5 glasses of alcohol on one occasion (Kalafatelis 2000a and 2000b; Kalafatelis and Edgar 1997; Kalafatelis and Fryer 2001; Edgar and Kalafatelis 1998; De Bonnaire 2000; and Dowden et al 2000).

5.2 Prevalence and Frequency of Drinking

It is common practice in New Zealand for young people under the age of 18 to drink alcohol. Between 94 and 99 percent of 14–17 year olds report that they have tried alcohol at some stage, according to the Youth and Alcohol Drinking Monitors (Kalafatelis 2000a and 2000b; Kalafatelis and Edgar 1997; Kalafatelis and Fryer 2001; Edgar and Kalafatelis 1998; De Bonnaire et al 2000; Dowden et al 2000). Between about 79 (1997, 2001) and 84 (2000) percent of these young people (depending on the year studied) report that they currently drink alcohol.

National alcohol surveys carried out in 1995 and 2000 reveal that most age groups showed no change in drinking frequency between the surveys, except for drinkers in the youngest groups aged 14–15 and 16–17 years, whose drinking became more frequent (Habgood et al 2001).

5.3 Risky or Heavy Drinking

The Youth and Alcohol Drinking Monitors consider the consumption of five or more glasses of alcohol on one occasion to be heavy or risky drinking, particularly for young people[6] (Kalafatelis 2000a and 2000b; Kalafatelis and Edgar 1997; Kalafatelis and Fryer 2001; Edgar and Kalafatelis 1998; De Bonnaire et al 2000; and Dowden et al 2000), who have a lower physiological tolerance of alcohol (Honkanen et al 1983; McLeod et al 1999). Various surveys carried out during the 1990s show the extent to which young people drink, and indicate that heavy drinking and the frequency of heavy drinking is increasing among young people. These are summarised in Table 1.

Table 1: Key Statistics from New Zealand Alcohol Surveys

Source	Heavy Drinking	Frequency of Heavy Drinking
Annual Auckland surveys (Casswell and Bhatta 2001). [These surveys are limited by a small sample size for young people aged 14–19 years.]	The average number of drinks consumed on one occasion among 14–19 year olds increased from 3–4 (1990) to 5–6 (1999). This was fuelled by increases among the 14–17 year old sub-group, whose average number of drinks rose over that period from 2–3 to 5–6.	
National surveys carried out in 1995 and 2000 (Habgood et al 2001).	The typical quantities consumed increased for males aged: 14–15 years (from 3 to 5 drinks). 16–17 years (from 4 to 7 drinks). 18–19 years (from 5 to 7 drinks). The typical quantities consumed increased for females aged: 16–17 years (from 4 to 6 drinks). 18–19 years (from 4 to 6 drinks). 20–24 years (from 4 to 6 drinks).	About 1 in 8 people consume 6 or more drinks (males) or 4 or more drinks (females) at least once a week. This did not change between 1995 and 2000. Of those aged 18–19, about 1 in 3 males and 1 in 4 females drank enough to feel drunk at least once a week.

[6] This equates to about 0.08 percent BAC if consumed by a male weighing about 80kg over a period of about 1 hour; or about 0.13 percent BAC if consumed by a female weighing about 60 kg over a similar timeframe (Northern Territory Government 2000).

Annual ALAC-commissioned Youth and Alcohol Drinking Monitors (Kalafatelis 2000a and 2000b; Kalafatelis and Edgar 1997; Kalafatelis and Fryer 2001; Edgar and Kalafatelis 1998; De Bonnaire et al 2000; Dowden et al 2000).	The proportion of young people aged 14–17 years who identify themselves as heavy drinkers is recorded as 35 percent in both 2000 and 2001.	Between 21 percent (1998) and 32 percent (2001) of young people report that they have been involved in risky drinking at least once over the last two weeks. The percentage of young people aged 14–17 years who drink 2 or 3 times a week, or almost everyday, increased from 7 percent in November 1997 to 12 percent in 2001.
The one-off **1996/97 New Zealand Health Survey** (Statistics New Zealand 1997a).	Over 56 percent of males aged 15–24 years and over 40 percent of females in this age group indulge in risky drinking (5 or more drinks consumed on typical day when drinking).	Nearly 7 percent of the males in this age group consume alcohol 4 or more times per week, while just over 3 percent of females in this age group do.

Rates of risky drinking are slightly higher for young Mäori than for non-Mäori in the same age group. The Youth and Alcohol Drinking Monitor published in September 2000 focused on differences in drinking patterns across ethnicity. This study found that 32 percent of young non-Mäori and 38 percent of young Mäori report risky drinking (Kalafatelis 2000b). In 1998, 45 percent of young people reported risky drinking at some time in the last three months, rising to 60 percent in 2000, and dropping back to 54 percent in 2001 (De Bonnaire et al 2000; Kalafatelis 2000a; Kalafatelis and Fryer 2001). The 60 percent response in the year 2000 was a weighted average of 63 percent of Mäori and 56 percent of non-Mäori (Kalafatelis 2000b).

A recent study of drinking frequency of 15 and 16 year-olds compared 21 European countries (with liberal drinking age laws) and the US (Grube 2001 based on ESPAD 1995 and MTF 1995). It found that a greater percentage of young people from nearly all European countries (compared with the US) report drinking at least one drink in the past 30 days. For a majority of these European countries, a greater percentage of young people report having 5 or more drinks in a row compared with the US. Some examples of the proportions of teenagers found to drink and to drink heavily are included in Table 2 as comparators with the New Zealand statistics included in Table 1.

Table 2: International Comparisons of Drinking and Heavy Drinking Prevalence Among Young People 1995

Country	Had Drink in Past 30 Days	Five or More Drinks in a Row
US	39 percent	24 percent
UK	73 percent	50 percent
Italy	65 percent	31 percent
Greece	74 percent	33 percent

5.4 Age of Onset of Alcohol Consumption

Generally, studies of the effects of age of drinking onset find that age of first exposure to alcohol is correlated with alcohol-related problems, frequency of drinking, typical amount consumed, and greatest amount consumed. Theory suggests that early exposure to alcohol might encourage young people to experiment. Alternatively, it may be that early exposure is an indicator of family environments that adopt a permissive and encouraging attitude toward alcohol use (Fergusson et al 1994).

A paper based on the cohort data from the Christchurch Health and Development Study (Lynskey and Fergussen 1995) concludes that early conduct problems were significantly associated with later substance abuse. It also found that children who showed tendencies to conduct problems at age 8 consumed 1.5 to 1.9 times more alcohol than others of the same age who did not show such conduct problems.

Another report on the longitudinal Christchurch Health and Development Study (Fergusson et al 1994) found that children introduced to alcohol before the age of 6 were 1.9 to 2.4 times more likely to report frequent, heavy or problem drinking at age 15 than young people who did not drink before the age of 13 years. The study controls for family, demographic features, and other factors.

The most recent Youth and Alcohol Drinking Monitor found that fifty percent of young heavy drinkers were under the age of 15 when they first began drinking (Kalafatelis and Fryer 2001).

5.5 Influence of Peers and Parents on Drinking Patterns and Sources of Alcohol

About two-thirds of youth respondents to the Youth and Alcohol Drinking Monitor surveys report that their parents know they drink. This differs according to ethnicity. The September 2000 Monitor that specifically focused on ethnicity and alcohol found that 61 percent of young Mäori drinkers, compared with 72 percent of young non-Mäori drinkers, stated that their parents knew about their drinking (Kalafatelis 2000b).

In 1997, 13 percent of young people aged 14–17 years stated that they personally bought alcohol. This dropped to 6 percent in 2001 (Kalafatelis and Edgar 1997; Kalafatelis and Fryer 2001). Parents and friends have increasingly become the key sources of alcohol for young people over the period examined. Thirteen percent of young people said in 1997 that they got alcohol from their parents, while 21 percent reported that friends supplied them with alcohol. These proportions rose to highs of 58 and 53 percent respectively in 2000, dropping back to 50 and 43 percent in 2001 (De Bonnaire et al 2000; Kalafatelis 2000a; Kalafatelis and Fryer 2001). About 5 percent of young people said that their parents gave them money to buy alcohol (De Bonnaire et al 2000; Kalafatelis 2000a; Kalafatelis and Fryer 2001).

According to the Youth and Alcohol Drinking Monitors, heavy drinkers are more likely to source their alcohol from parents (67 percent in 2001) while lighter drinkers generally source their alcohol from friends (54 percent in 2001). Mäori are more likely to source their alcohol from friends, while non-Mäori are more likely to do so from parents (Kalafatelis 2000b).

About 20 percent of young people aged 14–17 or 18 years report that they have given alcohol to someone under the age of 18. Thirty-six percent report peer pressure to drink and smoke (Kalafatelis and Fryer 2001). This proportion has risen from 18 percent in 1999 (Dowden et al 2000). In addition, attitudes toward alcohol encountered in the home can affect young people's later attitudes toward their own and others' drinking.

Parents influence the drinking of their children in ways other than directly providing them with alcohol. The Christchurch Health and Development Study has shown that children exposed to alcoholic parents had risks of adolescent psychiatric disorders (including substance abuse) that were between 1.6 and 3.0 times higher than the offspring of parents who did not have alcohol problems (Lynskey et al 1995).

5.6 Demographic Profile of Young Drinkers

Males aged 17 and 18 years are more likely to be heavier drinkers than non-drinkers or lighter drinkers. They are also more likely to be employed with more disposable income than other young people, to drive, and to smoke. Mäori are over represented as a proportion of their population in the heavy drinking figures, although the highest number of heavy drinkers is New Zealand European. Annex 2 provides a fuller demographic summary of young drinkers based on the annual Youth and Alcohol Drinking Monitors.

About 20 percent of young people aged 14–17 or 18 years report that they feel left out if they do not drink as much alcohol as others. Between 19 percent (1997, 1998) and 24 percent (2000) state that if they drink, they drink to get drunk (Kalafatelis and Edgar 1997; Kalafatelis and Fryer 2001; Edgar and Kalafatelis 1998).

5.7 Health Related Consequences of Drinking

This section attempts to benchmark data relating to alcohol use and health outcomes in New Zealand.

5.7.1 Mortality and Morbidity/Injury

The three main causes of death of young New Zealanders aged 10–24 years are motor vehicle accidents (33.5 percent), suicide (nearly 27 percent) and non-motor vehicle accidents (about 10 percent). Young people aged 15–24 years who died from these three causes in 1996 comprised about 78 percent of all young people in that age bracket who died. Alcohol can contribute to all three causes of death to some degree (Statistics New Zealand 1997b).

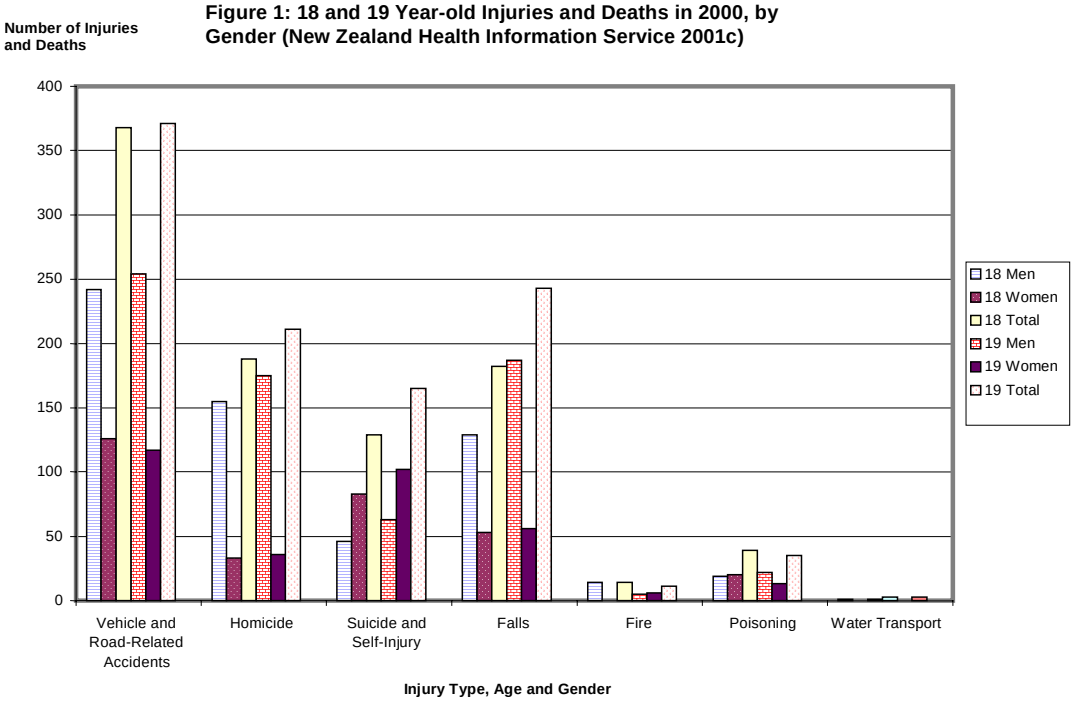
Analysis of external deaths across the period 1990 to 1996 shows that 10 percent of all people who die in this way across the entire population have alcohol detected in their bloodstream. For young people aged 14–17 years who die of an external death, this proportion is 12 percent. For those aged 18–24 years, the proportion is 17 percent. In all cases the proportions are higher for young males than for young females (New Zealand Health Information Service 2001b).[7]

[7] Analysis by ethnicity not available from this source. Note that the estimates used here only relate to those deaths for which blood alcohol levels were ascertained. Since this is not 100% of injury deaths the true percentage could be more or less

Figure 1 summarises preliminary NZHIS injury and death data for the year 2000 for young people aged 18 and 19 years (New Zealand Health Information Service 2001c).[8] While the data was provided in a form that makes it difficult to distinguish between mortality and morbidity, the graph does show that vehicle and road-related accidents comprise a significant proportion of accidents experienced by young people in this age group. They are newly able to legally purchase alcohol for their own consumption and can also obtain their full driving licence around this time. However, the legal maximum blood alcohol content (BAC) remains at the lower rate of 0.03 percent for under-20 year-old drivers (and those drivers of any age who hold a learner or restricted licence). [9]

New Zealand adolescents have rates of pregnancy, drug and alcohol abuse, suicide and self-harm that are among the highest in the western world (Watson 2001). Homicide, suicide, suicide attempts and falls are shown in Figure 1 to also be significant causes of injury and death for young people aged 18 and 19 years, although vehicle-related accidents remain the most significant cause of injuries and death for this age group (New Zealand Health Information Service 2001c).

Figure 1: 18 and 19 Year-old Injuries and Deaths in 2000, by Gender (New Zealand Health Information Service 2001c)



depending on the nature of any biases operating. For example, for many drownings it may not have be possible to ascertain the true blood alcohol content at time of death due to body decomposition. However, as blood alcohol tests are carried out for most motor vehicle deaths and suicides (or deaths from apparent self-harm), the percentage is more likely to be correct for those types of death. Alcohol is not an indicator on the national morbidity and mortality databases, which means that it is not a "necessary indicator" to collect or "necessary field" to fill. Therefore, this estimate is likely to be very conservative in some cases, including drownings.

[8] ALAC obtained this raw data by request from the New Zealand Health Information Service. Note that this is preliminary data only and was not published or made widely publicly available at the time that this report was written.

[9] The legal limit for under 20 year-olds is 30mg/100ml blood. This equates to 0.03 percent BAC.

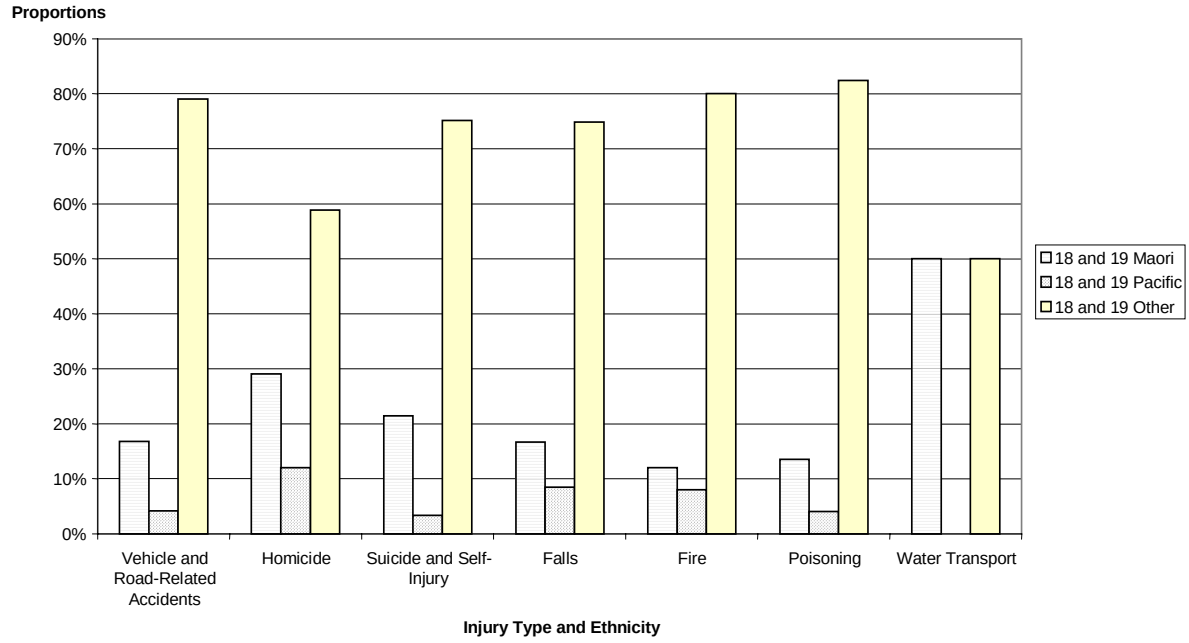
Mäori aged 18 and 19 years make up about 21 percent of the population of 18 and 19 year-olds, and are clearly over-represented in the area of homicides in particular, but also in vehicle-related accidents, suicides, self-harm, and falls (Figure 2).

The Injury Prevention Research Unit has found that not only is injury the third leading cause of death for Mäori (accounting for 12 percent of all deaths for Mäori), injury is also the second leading cause of morbidity for Mäori (accounting for 12 percent of all discharges for Mäori) (Broughton and Langley 2000).[10] While falls are the single main contributor to injury for Mäori, Mäori aged 15–24 years are more likely to be injured in a motor vehicle accident.

Analysis by the Injury Prevention Research Unit of NZHIS data between the years 1984 and 1993 has found that 79 percent of all deaths of young Mäori aged 15–24 years were caused by injury. This compares to the 12 percent of all deaths of Mäori across all ages that were caused by injury. Furthermore, 52 percent of suicide by Mäori occurred among the 15–24 age group and 29 percent of homicides involving Mäori occurred among the 15–24 age group (Langley and Broughton 2000). For young Mäori, motor vehicle traffic crashes and suicides (especially hangings) were the leading injury mortality.

Injuries from motor vehicle crashes and suicides are the leading causes of death among Pacific peoples according to analysis of NZHIS data from between 1988 and 1994 (Lima and Tukuitonga 2000). For Pacific peoples, injuries from falls, motor vehicle crashes, sports, and assaults were the main reason for hospitalisation due to injury between 1988 and 1996, based on NZHIS data (Lima and Tukuitonga 2000). Sports injuries were the most common cause of hospitalisation for young Pacific people aged 15–24 years, followed by assaults and falls. In all cases, males are the main contributors to the injury statistics for young Pacific people.

Figure 2: Ethnicity of Injured and Killed 18 and 19 Year-olds in 2000, by Injury Type (New Zealand Health Information Service 2001c)



The following sections review what is known about the various causes of non-fatal injury and injury deaths for young people, particularly those aged 18–19 years. They also detail other types of morbidity and mortality common to young people in that age group and that are often linked to alcohol use and misuse.

5.7.2 Motor Vehicle Accidents

Without a proper study of the pre- and post-intervention data it is difficult to identify whether or not the lowered purchase age has had any statistically significant impact on the New Zealand driving figures. Alcohol alone is estimated to contribute, on average, to 14.5 percent of fatal crashes across all ages (LTSA 2001b). About 30 percent of all fatally injured 15–19 year old drivers had BAC over 30 mg/100 ml in the year ending 31 December 2000 (New Zealand Health Information Service 2001c).[11]

Two standard drinks have been shown to result in cognitive and psychomotor effects that increase risk of injury such as impacts on reaction time, cognitive processing, co-ordination and vigilance.[12] While the risk of crash-related injuries increases with the amount of alcohol consumed for all age groups, younger drivers at a given BAC are at much greater risk compared with older drivers. This is because of the combination of young drivers' lower tolerance to alcohol and their relative inexperience in driving (National Health and Medical Research Council 2001). Young males are more likely than young females to be involved in vehicle-related crashes. About 71 percent of all 15–24 year old drivers primarily responsible for causing a crash in 2000 were males (LTSA 2001b). The National Injury Query System run by the University of Otago Injury Prevention Research Unit shows that the 1998 New Zealand age-specific injury death rate for males aged 15–19 years was 79.3 (per 100,000 population) compared with a rate of 48.8 (per 100,000 population) for females (IPRU 2000a).[13] This rate for females is the highest age-specific mortality rate due to injury that females of any age experience under age 65 (51.3 per 100,000 population). The rate for females aged 15–19 years is about 62 percent that for males of the same age.

Young driver involvement in injury crashes appears to be trending downwards. Drivers aged 15–19 years contributed to 14.5 percent of all injury crashes (2302) in 1996, reducing to just over 13 percent by 2000 (1537). Drivers aged 20–24 years were involved in 2963 injury crashes (17 percent of all injury crashes) in 1996, reducing to 1669 injury crashes (just over 14 percent) in 2000 (LTSA 2001a).[14]

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[10] Data for the analysis was only available to 1995.

[11] The LTSA and NZHIS figures should be considered separately. ALAC acknowledges that elevated alcohol levels are not necessary and sufficient for crashes to occur. It is likely that alcohol did not contribute to the death of a proportion of the deceased 20-24 old drivers whose blood contained 30 mg/100 ml.

[12] One standard drink per hour will raise a person's BAC by approximately 0.01–0.03g% depending on gender, how fats the person consumes the drink, weight, and whether or not the person has eaten recently, among other factors such as health status. This means that 2 standard drinks in an hour may result in a BAC level that is equal to or greater than the legal limit for drivers under 20 years (Drug and Alcohol Services Council 1996; Living with Alcohol 1997).

[13] The National Injury Query System advises that rates per 100,000 population are crude rates and are, therefore, not calculated for counts of fewer than 5 injury fatalities.

[14] While these data would be more useful represented as rates (e.g. per 100,000 people or per 10,000 vehicles), the LTSA has not historically collected this data in a way that would allow them to be presented as rates.

LTSA statistics are reinforced by the decreasing number of new and ongoing claims to the ACC's Motor Vehicle Account for the age group 15–19. New claims have decreased from 1,184 per annum in 1996/1997 to 821 per annum in 1999/2000. The number of ongoing claims (for more serious injuries) for this age group is also reducing, down from 1,903 in 1996/1997 to 1,828 in 1999/2000. A similar pattern is observed for the age group 20–24 (ACC 2001a).[15]

Young people aged 17–19 years contributed between 13 and 15 percent of all convicted cases for traffic offences involving alcohol over the period 1990 to 1998. By contrast, the age group 20–24 has shown a declining contribution from 28 percent in 1990 to 18 percent in 1998 (New Zealand Health Information Service 2001b).

Young person involvement in fatal crashes also appears to be trending down as a proportion of all crashes. This reflects a broader trend, whereby the total number of fatal crashes for the total population showed a decreasing trend between 1991 and 2000 (LTSA 2001b).[16] Drivers aged 15–19 years were involved in 14 percent of all fatal crashes in 1996, reducing to just under 10 percent in 2000 (LTSA 2001b). Drivers aged 20–24 years have similarly reduced their overall involvement in fatal crashes over the period 1996 to 2000. This group was involved in 100 fatal crashes (nearly 15 percent of all fatal crashes) in 1996, reducing to 72 (nearly 12 percent) in 2000 (LTSA 2001b).[17]

Figure 3 shows the trends in vehicle accidents (injuries and deaths) for males and females aged 18–19 years between 1995 and 2000 (New Zealand Health Information Service 2001c).[18] However, the year 2000 has shown an increased number of accidents for both genders in this age group, including an increase of over 45 percent for males between 1999 and 2000.[19]

The preliminary data from 1996 to 2000 for vehicle accidents shows that the contribution of 18 and 19 year-old Mäori and Pacific peoples to total injuries and deaths has remained fairly constant over the time frame (New Zealand Health Information Service 2001a and 2001c).[20]

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[15] Injuries are more likely than deaths to result in ACC liabilities (particularly ongoing liabilities). Therefore, comparative ACC data is unavailable for fatalities.

[16] It is difficult to know what the factors are that have impacted upon the fatal crash rates and trends. There have been both falls and rises in rates over the decade, but overall there is a marked downward trend in fatal crashes. It is important to recognise that this trend may result from a number of factors. For example, changes to the way data has been collected, additional targeted funding for local CBT or road patrols, and changes in the positions of CBT checkpoints may have impacted upon alcohol-related crash outcomes. The introduction of speed cameras and the LTSA's comprehensive anti-drink-drive campaign is also likely to have some reducing effect. The compulsory presentation of driver licenses and the introduction of photo driver licences began during the 1999–2000 period and may have made some impact upon driving behaviours, although this is less likely for drink-drivers than for other motorists.

[17] Again, while these data would be more useful represented as rates (e.g. per 100,000 people or per 10,000 vehicles), the LTSA has not historically collected this data in a way that would allow them to be presented as rates.

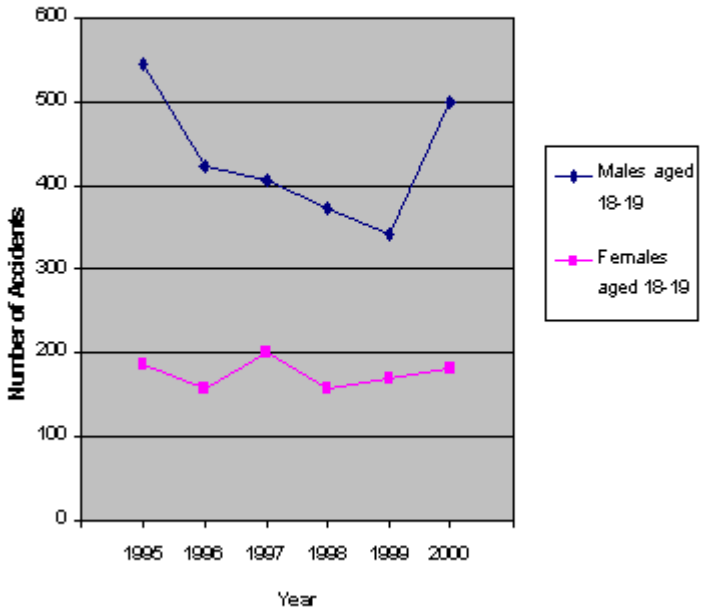
[18] Note that the preliminary data received from NZHIS did not differentiate between accidental deaths and accidental injuries.

[19] Once again, it was not possible to define the percentage of these accidents that were alcohol-related. ALAC recognises that drawing conclusions from trend data of this nature can be problematic due the potential effects of changes in service delivery and other externalities over time.

[20] Ethnicity data is not available for 1995. Like the figures by gender, it was not possible to define the percentage of these accidents that were alcohol-related

New Zealand and the US reveal the same proportions of road deaths per 10,000 vehicles (2.0 in both countries). The US is a key source of empirical evidence relating to the relationship between drinking ages and fatal vehicle crashes. To extrapolate for New Zealand purposes, similarities must be identified between the two countries in relation to vehicle crashes. The number of road deaths per 100,000 population is 15.3 in the US, slightly higher than New Zealand's 13.3. By comparison, Australia has a rate of 9.3 road deaths per 100,000 population (New Zealand Health Information Service 2001a; MOSP 2001a).

Figure 3: Vehicle Accidents (Injuries and Deaths) for 18 and 19 Year-olds by Gender, 1995-2000 (New Zealand Health Information Services 2001c)



5.7.3 Suicide and Suicide Attempts/Self-Harm

A number of New Zealand studies identifying a link between alcohol and suicide attempts are summarised below.

- Coggan and Norton's 1994 article on strategies for treating the underlying risk factors for suicide notes that the most common pre-suicide diagnoses are alcohol abuse, depression, anxiety disorder and aggressive behaviour (Coggan and Norton 1994 mentioning Garland and Ziegler 1993 and Rich 1986).
- Beautrais found significant evidence of a causal link between substance use disorders and youth suicide, with odds ratio estimates ranging from 3.3 to 10.7 (median = 5.5) (Beautrais 2000).
- An earlier Beautrais case-controlled study found that young people making serious suicide attempts showed elevated rates of substance use disorders (just under 39 percent) (Beautrais et al 1998a).

The National Health Committee's guidelines for schools relating to the prevention, recognition and management of young people at risk of suicide review a range of New Zealand and overseas studies showing that about 90 percent of young people who attempt suicide exhibit symptoms of depression, substance abuse problems, criminal offending, or some other antisocial behaviour prior to a serious attempt or suicide (Beautrais et al 1997).

Beautrais notes that examination of the development of suicidal behaviours in the longitudinal Christchurch Health and Development Study showed that by 16 years, 12 percent of the cohort reported suicidal ideation and 3 percent reported having made a suicide attempt (Beautrais 1995 mentioning Fergusson and Lynskey 1995). The 3 percent was composed of 4.2 percent of young females and 1.9 percent of young males. While successful suicide is more likely to be carried out by males, self-harm appears to be more likely to be carried out by females.

Hospitalisation for suicide attempts among young people aged 15–24 years amounted to 401 males and 779 females in 1997, and to 416 and 676 respectively in 1998. The Ministry of Youth Affairs notes that hospitalisation rates for self-inflicted injury and suicide attempts by the 15–24 age group have declined from just over 234 per 100,000 in 1994 to 201 per 100,000 in 1999 (2001). Nominal trends recorded by the NZHIS between 1995 and 2000 relating to suicide and self-harm for 18 and 19 year olds show fairly constant figures until 1999. Figures between 1995 and 1999 range between 236 and 281 per annum. The NZHIS combined figure for the year 2000 has markedly increased, however, to 423. As mortality statistics show that the number of suicides is falling, it follows that the increases must relate to self-injury and suicide attempts (New Zealand Health Information Service 2001c).

Youth suicide trends for each gender and ethnicity group for 15–24 year-olds show no discernible trends over the period 1996 to 1998 as indicated in Table 3. While the rates fluctuate in different directions from one year to the next, two facts remain constant:

- Young Mäori have higher proportional suicide rates than young non-Mäori; and
- Young males have higher suicide rates than young females.

Table 3: Suicide Rates by Gender and Ethnicity (per 100,000 Population Aged 15–24) 1996–1998 (MOSP 2001a).

Year	Males	Females	Mäori	Non-Mäori
1996	37.9	14.0	36.0	23.7
1997	41.1	10.8	33.9	24.3
1998	38.5	13.3	40.3	22.6

A comparison of youth suicide rates in selected OECD countries (Finland, Australia, Canada, US, Norway, France, Sweden, Germany, Japan, UK and the Netherlands) shows that New Zealand had the highest 1998 rate of suicide among 15–24 year-olds (MOSP 2001a; Ministry of Youth Affairs 2001).

5.7.4 Non-Motor Vehicle Accidents

Non-motor vehicle injuries and fatalities for the 15–19 year old age group are mainly the result of falls, fires, boating or other recreational accidents, poisoning, drowning and homicide (as fatalities), and assaults/violence. Homicide is considered here in a separate section. Data for assaults and family violence are presented within the general non-vehicle related statistics sourced from the New Zealand Health Information Service and are, therefore, difficult to isolate. More specific statistics are available from the Police database, but they have not been sourced for this report as ALAC considers that such issues more appropriately sit with the Ministry of Justice review. The annual Youth and Alcohol Drinking Monitors, however, reveal that between 30 and 44 percent of heavy drinkers, and between 15 and 30 percent of lighter drinkers, have been involved in a fight or argument following drinking (Kalafatelis 2000a and 2000b; Kalafatelis and Edgar 1997; Kalafatelis and Fryer 2001; De Bonnaire et al 2000; Dowden et al 2000; Edgar and Kalafatelis 1998).

The number of non-vehicle accidents involving injuries and experienced by 18 and 19 year olds fluctuates from year to year for both males and females as shown in Figure 4. Nevertheless the overall nominal trend is a rising number of accidents.[21] For example, the NZHIS data[22] shows a steady increase in the number of young people aged 18 and 19 years experiencing falls. From 231 recorded in 1995, this increased to 379 in 1999, moving up to 425 in 2000.

Figure 4 shows that non-vehicle injuries and deaths for young people aged 18 and 19 years are rising for males and falling for females. This data is not analysed as a percentage of the relevant aged population (New Zealand Health Information Service 2001a and 2001c).

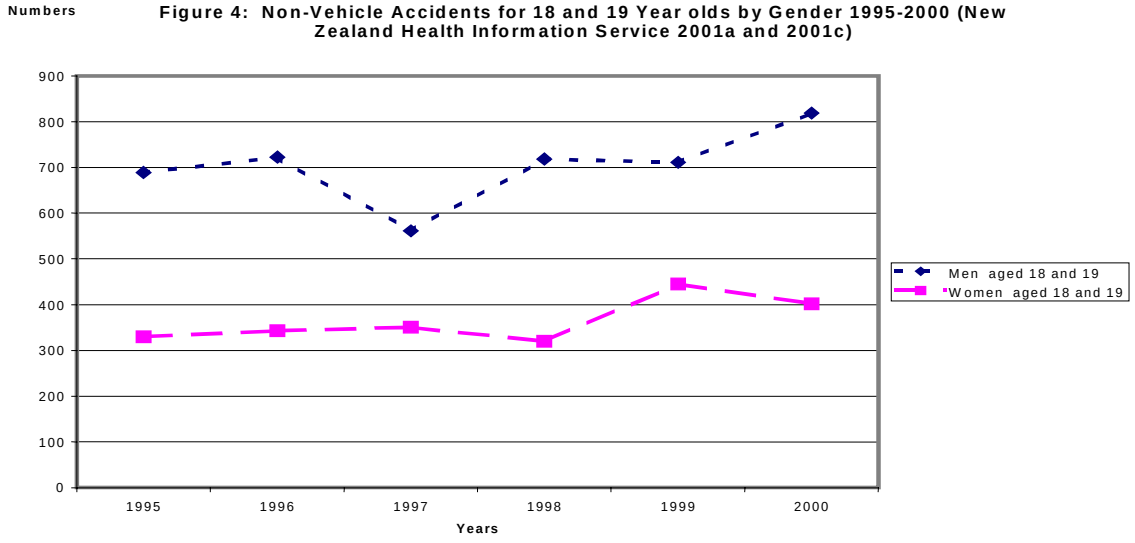


Figure 4: Non-Vehicle Accidents for 18 and 19 Year olds by Gender 1995-2000 (New Zealand Health Information Service 2001a and 2001c)

Consistent with trends observed in the data from the NZHIS, just under 6,830 young people aged 15–19 years newly claimed for injury under ACC's Earners and Non-Earner's accounts in

[21] This graph combines injuries and fatalities.

[22] Not analysed as a percentage of the relevant aged population.

1994/95. This compares with just over 7,650 claimants in 1999/2000 (ACC 2001a). There is no available analysis of the role of alcohol in these injuries

Between 55 and 72 percent of young heavy drinkers, and between 30 and 36 percent of lighter drinkers, reported in the Youth and Alcohol Drinking Monitors that they have fallen over and hurt themselves as a result of alcohol misuse (Kalafatelis 2000a and 2000b; Kalafatelis and Edgar 1997; Kalafatelis and Fryer 2001; De Bonnaire et al 2000; Dowden et al 2000; Edgar and Kalafatelis 1998).

Humphrey and Casswell (2001) recently found a 4 percent incidence of alcohol-related injury among 15–17 year-olds presenting at Auckland hospital in New Zealand, compared with a 39 percent incidence among 18–29 year-olds. Seventeen percent of all injuries related to violence, and over 80 percent of injuries caused through violence were found to be alcohol-related. A retrospective observational study of people presenting at the Auckland Hospital Emergency Department with alcohol-related conditions found a 52 percent increase in 18–19 year-olds and an additional 34 percent of young people under the age of 18 presenting subsequent to the lowering of the purchase age (Everitt and Jones 2002).[23]

Health statistics show that 10 young people aged 15–24 years died from an accidental fall in 1997 (New Zealand Health Information Service 2001a). The most recent figures relating to falls (and which are broken down by age, gender and ethnicity) do not distinguish between falls resulting in deaths and those where non-fatal injuries were sustained.[24]

According to NZHIS data, alcohol was involved in 19 percent of all deaths by drowning over the period 1980 to 1999 (New Zealand Health Information Service 2001b).[25] However, a 1998 Injury Prevention Unit study of alcohol data in coronial files for death by drowning concluded that "the quality and completeness of Coronial information on alcohol involvement in drowning is insufficient to arrive at an accurate estimate of the role of alcohol in drownings" (Warner et al 1998). The collection of alcohol data for deaths by drowning is not mandatory or even common practice in New Zealand.

An Auckland-based follow-up study by the Injury Prevention Unit of drownings between 1988 and 1997 and boating-related drownings between 1980 and 1997, found that the proportion of people who had drowned and who had a positive BAC was much higher than 19 percent (Smith et al 1999). In summary, this study found that in people aged 15–64 years who drowned, 40.5 percent had a positive BAC. Nearly a third (31 percent) were intoxicated, with a BAC of at least 0.1 percent. It also found that for all boating-related drownings for people aged 15–64 years, just over 43 percent had a positive BAC, while 27 percent were intoxicated.

A New Zealand study of fire-related injuries in New Zealand treated in hospitals between 1988 and 1995 found that ethnic minorities are over represented in household fire injuries (Duncanson

[23] This study was carried out during the 12 months before and the 12 months after the lowering of the drinking age.

[24] ALAC obtained its most recent data by request from the New Zealand Health Information Service. As this data was preliminary and was available to ALAC only in a combined form (i.e. not separated into injuries and injuries resulting in death) they have been compared to combined data from other years for consistency. Note that this is preliminary data only and was not published or made widely publicly available at the time that this report was written.

[25] This source indicates that in 1997 alone, 17 young people aged 15 to 24 died as a result of drowning or accidental suffocation.

et al 2000).[26] New Zealand Fire Service analysis of its own data estimates that an estimated 54 percent of fire-related injuries sustained over a five year period are directly related to alcohol and drugs (Arthur 2001). The analysis shows that fires and burns account for 7 percent of the deaths of Mäori children aged under 1 year, 15 percent of Mäori children aged 1–14 years, and 11 percent of older Mäori.

Boot and Treep's 1990 literature review of fires and alcohol summarised studies estimating that between 17 percent and 62 percent of fire fatalities and burns relate to alcohol consumption. Most commonly, around 30 percent of fatalities were found to be associated with alcohol.

ALAC found little data that broke poisoning rates down by poisoning type or age group, particularly recent data. In 1997 there were 27 accidental poisoning injuries and deaths across all age groups in New Zealand, an increase from 26 cases in 1996 and 24 cases in 1995. As a subset of this group, four young people aged 15–24 years died from accidental poisoning in 1997, about 15 percent of the total injuries and deaths by poisoning for New Zealand in that year (New Zealand Health Information Service 2001a).[27] Poisoning made up about 4 percent of injuries and fatalities of 18 and 19 year olds in the year 2000 (New Zealand Health Information Service 2001c).[28] However, it is unclear how many of these poisoning injuries and fatalities were alcohol-related.

5.7.5 Homicide

Two hundred and eighty-nine young people aged 18 and 19 years were involved[29] in a homicide or purposeful injury of others in 1995, increasing to 399 in 2000 (New Zealand Health Information Service 2001a and 2001c). It is likely that a significant proportion of these numbers relate to injury, as statistics from 1997 show that 10 young people aged 15–24 years were killed in a homicide in that year (New Zealand Health Information Service 2001a).

A 1995 study of homicide in New Zealand over the ten-year period 1978–1987 using multivariate analysis found that the mortality rate from homicide was 1.6 per 100,000 population per year.[30] The rate for males (2.0) was higher than for females (1.2). The rate for males peaked at 5.0 between ages 20–24, while the rate for females peaked at 2.3 between ages 25–29. Mäori had higher rates than non-Mäori, with the age-adjusted rate for Mäori found to be 3.1. The comparable rate for non-Mäori was 1.5. The authors of the study suggest that "the issue of increasing trends in the rates of homicide need to be examined…in relation to trends in such factors as alcohol consumption and unemployment" (Chalmers et al 1995).

[26] Note that only a small proportion of all fire-related injuries will be severe enough to require treatment by a hospital. A number of minor burns will be self-treatable or able to be treated by a general practitioner, ambulance staff (without a hospital admission) or at a community health centre).

[27] The accidental poisoning figures include all types of poisoning, including poisoning by alcohol.

[28] ALAC was able to identify no complete data relating to non-fatal and potentially fatal poisoning cases resulting in hospitalisation for the 2000 year at the time this study was undertaken.

[29] Statistics do not show whether this refers to victims or perpetrators of homicides. However, literature shows that alcohol is often a factor in violence in wither the victim or the perpetrator or both, particularly in domestic violence situations.

[30] All rates referred to in this paragraph are per 100,000 age-adjusted population.

5.7.6 Mental Health

In future, a Mental Health Tracking Survey may be able to provide information on young people with alcohol-related mental health disorders.[31] At this time, however, the most recent population data available relates to 1994 (New Zealand Health Information Service 1998), while sample data from the Christchurch Health and Development Study relates to 1998 (Horwood and Fergusson 1998). Data relating to suicide and suicide attempts/self-harm are considered in earlier sections of the report.

A) Prevalence of Alcohol-Related Disorders

The Christchurch Health and Development Study examined the prevalence of psychiatric disorders in 16–18 year-olds participating in the survey. Over 40 percent met standard diagnostic criteria for at least one psychiatric disorder, with the most common being substance abuse (24 percent), mood disorders (22 percent), anxiety disorders (17 percent) and conduct disorders (5 percent) (Horwood and Fergusson 1998). Young Mäori (33 percent) and young males of all ethnicities (29 percent) reveal a particularly high prevalence of substance abuse disorders (Horwood and Fergusson 1998).

The disorders were often comorbid, with the result that 42 percent of those with disorders (18 percent of the total sample) met criteria for more than one disorder. It is suggested that the figures give an upper limit estimate of the number of young people requiring psychiatric treatment since some of those meeting criteria for disorder may not have had symptoms of sufficient severity to justify clinical treatment (Horwood and Fergusson 1998).

B) Residential Treatment

Data relating to residential treatment excludes community-based and NGO-delivered treatment services.

As at 31 December 1994, 60 young people aged 15–19 years, and 7 people under the age of 15 were "mental health hospital residents" (New Zealand Health Information Service 1998).[32] Table 4 shows the number of young people throughout the 1994 year who were admitted or readmitted for an alcohol-related reason. Mäori are significantly over-represented in these figures (New Zealand Health Information Service 1998).

Of all first admissions in 1994 for young males aged 15–19 years, about 31 percent related to alcohol dependence or abuse. Of first admissions for females in this age group, the proportion was about 27 percent. Alcohol was the single leading cause for admissions for this age group (New Zealand Health Information Service 1998).

[31] Although regional meetings of alcohol-related services in the South Island recently raised the possibility that the Tracking Survey will exclude mental health issues relating to alcohol and drugs.

[32] Note that figures may be inflated as they relate to readmissions as well as admission.

Table 4: Young People Aged 15 –19 Admitted or Readmitted for Alcoholic Psychoses or Alcohol Dependence or Abuse-Related Mental Disorders in 1994 (New Zealand Health Information Service 1998)

Young People Aged 15–19	First Admissions	Readmissions
Total 15–19 years	199 (69 younger than age 15)	24 (3 younger than age 15)
Males 15–19 years	117 (32)	13 (3)
Females 15–19 years	82 (37)	11 (0)
Mäori 15–19 years	45 (21)	2 (0)
Mäori Males 15–19 years	22 (10)	2 (0)
Mäori Females 15–19 years	23 (11)	0 (0)
Pacific peoples 15–19 years	6 (1)	0 (0)
Pacific Males 15–19 years	4 (0)	0 (0)
Pacific Females 15–19 years	2 (1)	0 (0)

5.7.7 Sexual Health

Young people in the 15–19 age group are a high risk-taking demographic population. This age bracket in a young person's life often features experimentation with substances, sexual activity, and other risky activities. Young people gain their majority between the ages 15–19, which legally allows them to gain a driver's licence, purchase alcohol and cigarettes, and marry, join the armed services, vote and have sexual intercourse.

A) Teenage Births

New Zealand has high teenage birth rates compared with other developed nations.[33] Between 1996 and 2000, the numbers and rates of births to teenage females rose between 1996 and 1997 and have steadily reduced since that time. Total births to teenagers were 1,431 in 1996 and 1,175 in 2000. Over half of all teenage births are to Mäori females.

A 1995 study of risk-taking among young people in Auckland and Northland concluded that 40 percent of the respondents (93 percent of whom were aged 16–17 years) reported having ever had sexual intercourse. Of this group the age at first intercourse ranged from under 10 years (3 percent), 11–13 years (11 percent), 14–16 (23 percent), to 16 years and over (63 percent). Of those who had ever had sexual intercourse 49 percent reported not always using contraceptives during the previous 12 months (Coggan et al 1997).[34]

B) Abortion

As well some other health outcomes, any links between alcohol use and abortions have not been established. Abortion data has been included here for similar reasons to teenage birth data; in that

[33] For most of the past decade, New Zealand was second only to the US in relation to teenage birth rates. Over that time teenage childbearing rates declined in many developed countries including New Zealand and the United States. New Zealand now ranks third in the world (MOSP 2001). As data on birth rates for females aged under 18 is not readily available for many countries, the under-20 birth rate is used for an international comparison.

[34] ALAC identified little high quality New Zealand data that relates to the link between alcohol and teenage pregnancy.

abortion is one potential outcome of alcohol-related sexual intercourse, particularly given the figures for unprotected sexual activity among young people.

Abortion rates for females aged 15–19 and 20–24 years increased by 10 percent and 14 percent respectively between 1996 and 2000 (Statistics New Zealand 2001). At the latter end of this time period, between 1999 and 2000, the abortion rate for teenagers rose by 8 percent, while that for females aged 20–39 years increased by about 4 percent (*Abortions year ended December 2000* 2000).

Analysis of the distribution of abortions in 2000 by age and ethnicity shows that while 19.8 percent of all abortions in that year were to females younger then 20 years of age, that proportion comprised higher rates for Mäori and European females, and substantially lower rates for Pacific and Asian females (Khawaja et al 2001).[35]

C) Sexual Harassment and sexual assault

There appears to be little data on sexual harassment in relation to alcohol use and young people. One 1995 survey found that 3 percent of male respondents and 11 percent of female respondents experienced sexual harassment over the previous year as the result of someone else's drinking (New Zealand Health Information Service 2001b). This data has not been broken down by age.

Between 15 and 29 percent of heavy drinkers and between 6 and 9 percent of lighter drinkers (depending on the year surveyed), reported in the Youth and Alcohol Drinking Monitors that they have ended up in a sexual situation with which they were not happy, following drinking (Kalafatelis 2000a and 2000b; Kalafatelis and Edgar 1997; Kalafatelis and Fryer 2001; De Bonnaire et al 2000; Dowden et al 2000; Edgar and Kalafatelis 1998).

D) Sexually Transmitted Infections

The 1995 study by Coggan et al of the risk-taking behaviour of Auckland/Northland teenagers found that of those who had ever had sexual intercourse, 55 percent did not always use condoms as protection from sexually transmitted diseases. This was made up of 72 percent of the young females and 42 percent of the young males. This study did not provide data on associations between risky sexual behaviour with the use of alcohol.

In 1999, 70 percent of chlamydia cases, 69 percent of gonorrhoea cases, and 63 percent of genital warts cases reported were found in people aged less than 25 years.[36] Rates of chlamydia and gonorrhoea were disproportionately high in Mäori and Pacific peoples. Genital herpes rates

[35] Comparatively, averaged across the total population of females aged 15–44 years who had an abortion in 2000, Asian females had the highest abortion ratio (311 abortions per 1,000 known pregnancies) and New Zealand European/Pakeha females the lowest (210 per 1,000) in 2000. Mäori females and Pacific females recorded abortion ratios of 257 and 253 per 1,000 respectively (*Abortions year ended December 2000* 2000).

[36] Data from 2000 shows that over 53 percent of sexual health clinic attendees are aged between 15 and 24. Of this group, over 59 percent were female (Turley M, McNicholas A. 2000). Statistics on sexually transmitted infections (STIs) are sourced from the 31 sexual health clinics around New Zealand. A recent paper considering the incidence of chlamydia and gonorrhoea indicates that the sexual health clinic-based STI surveillance system appears to significantly under-report the incidence of these infections (McNicholas et al 2001).

were highest in European populations, while rates of genital warts were similar in all ethnic groups (Turley and McNicholas 2000).

Between 1996 and 1999, there was a 40 percent increase in cases of both chlamydia and gonorrhoea in sexual health clinic attendees (Turley et al 2000). The number of cases of chlamydia reported in the July to September quarter of 2000 was 25 percent higher than the number of cases reported in the same quarter in 1999 (Turley and McNicholas 2000).[37]

5.7.8 Other Consequences and Longer-Term Effects

This study has focused on health impacts and so has not attempted to source data relating to youth offending in New Zealand. The Minister of Justice announced that a wider review of impacts of the lowered purchase age would be available in the first half of 2002, which would include impacts such as any increases in offending.

The NZHIS defines alcohol-related morbidity as conditions that are the underlying cause of death. These include alcoholic psychoses, alcohol dependence syndrome, nondependent alcohol use disorder, alcohol cardiomyopathy, alcohol gastritis, alcoholic liver disease and poisoning by alcoholic beverages (New Zealand Health Information Service 2001b). Table 5 shows that mortality rates for males due to alcohol-related conditions has declined since 1990. Mortality rates for females due to alcohol-related conditions fell until 1992 and had risen again by 1996. The Mäori mortality rate due to alcohol-related conditions was over three times greater than the non-Mäori rate of 4.1 in 1996.

Table 5: Age-Standardised Mortality Rates Due to Alcohol-Related Conditions per 100,000 Population (New Zealand Health Information Service. 2001b**)**

Population Group	**1990**	**1996**
Males	6.6	4.8
Females	1.6	1.9
Population Group	**1996 Mäori**	**1996 Non-Mäori**
Total	14.2	4.1
Females	3.4	1.7

In October 2001 a study of Fetal Alcohol Syndrome and associated conditions in New Zealand was carried out through 1,000 midwives around New Zealand. The results indicated that about 82 percent of all pregnant teenagers are drinkers and are potentially at-risk in terms of fetal damage. It is estimated that about 3,180 children were born to teenage mothers in 1999 with possible alcohol-related neurological defects (Wharemate and Kitson 2001).

In 1997, Brian Easton estimated the costs of alcohol misuse in New Zealand. His best estimate for the economic and social costs of alcohol usage in 1990 was over $16 billion. This was equivalent to 4 percent of GDP for the 1990/1991 year and 2 percent of quality-adjusted life years. Mortality and morbidity effects dominate the valuation. The costs of alcohol misuse also

[37] This data was for attendees of all ages.

damage the material welfare of the nation by reducing its production capacity and by diverting resources towards remedying the misuse (Easton 1997).

6. INTERNATIONAL EXPERIENCES WITH YOUTH DRINKING

A significant number of robust overseas studies have been undertaken relating to the impacts of various alcohol-related policies and proposals. These policies include publicity, policing/enforcement, raising and lowering the minimum legal drinking or purchase age, increasing alcohol excise taxes, and raising the price of alcohol. In addition, prevention programmes targeting parents, peers, and young drinkers have been tested and studied.

While the bulk of the empirical evidence originates from the US, some studies have been published in Canada, Australia, the UK, and occasionally other European countries. This section summarises that material in order to provide the context for an initial health impact assessment of the lowering of the purchase age in New Zealand.

6.1 Overview of the International Literature Findings

Most international studies conclude that the younger the onset of drinking, the more likely are adverse outcomes such as injuries, fatalities, and unsafe sex. Numerous multivariate studies show a direct causal link between a lowered drinking age and increased fatalities and injuries from motor vehicle crashes, together with increased numbers of suicide. Most studies also appear to show that the younger the age of drinking onset, the more likely it is that longer-term adverse outcomes could arise such as alcohol dependence and abuse, and alcohol-related medical conditions.

Most of the literature reviewed for this report originates from the 1980s to 2001. ALAC used only a very select sample of international literature from the 1970s, as it was felt that in a number of thematic alcohol-related areas, many real changes in culture have occurred since that decade. Therefore, not all literature from that era was useful for comparison with the New Zealand benchmarking data.

6.2 Drinking Patterns

Some studies show that although increasing the drinking age does reduce fatalities, it may not always reduce the prevalence or amount of drinking by young people. It can mean that alcohol is more readily supplied by friends and family, and that more drinking takes place behind closed doors rather than in bars and public places thus reducing young people's exposure to some key risk factors (drink-driving, street violence, etc) (Hughes and Dodder 1992). Research by Hingson et al (1985), for example, compared the drinking patterns of 16–19 year-olds in Massachusetts with those in New York state (which has a minimum legal drinking age of 18) during the period 1980 to 1982 over which time the drinking age in Massachusetts was raised from 18–20. The study concluded that the average daily consumption of alcohol in the 16 to 19 year age group did not decline in the period after the drinking age was raised in Massachusetts.

However, other studies have found that raising the drinking age to age 21 could reduce the frequency of drinking by young 'frequent' drinkers by between about 3 and 28 percent (Hingson et al 1985; O'Malley and Wagenaar 1991; Coate and Grossman 1987).[38]

A later study by Coate and Grossman (1988) concludes that the frequency of consumption is inversely related to the real price of beer, and that this effect is larger than the impact of the drinking age. Raising the drinking age to 21 years is estimated to reduce the number of 'frequent' young drinkers by 28 percent, and reduce the number of 'fairly frequent' young drinkers by 11 percent. Aligning beer and 'liquor' taxes[39], and increasing beer prices with the rate of inflation is estimated to reduce the number of 'frequent' young drinkers by 32 percent, and reduce the number of 'fairly frequent' young drinkers by 24 percent (Coate and Grossman 1988).

Opponents of a drinking age of 21 years have suggested that even if a higher drinking age reduced alcohol use among minors, the drinking rates and alcohol-related problems would then surge among those aged 21 years or older (a 'drinking to make up for lost time' theory). O'Malley and Wagenaar disproved this theory (1991). They found that lower rates of alcohol use due to a higher legal drinking age continued, even after young people turned 21. They did not appear to feel the need to 'make up for lost time'.

6.3 Age of Onset

According to DeWit et al (1997), the major risk period for initiation into alcohol, tobacco and most illicit drugs appears to begin around age 12, peaks at age 16, and is mostly over by age 22. The highest risk period for initiation to alcohol alone begins around age 14 and peaks by age 19. Males have higher rates of onset for most drugs than females. Male drug users are significantly less likely than female drug users to quit using a drug.

Early onset of drinking is associated with alcohol dependence and alcohol abuse in later years. This association is highly statistically significant. The authors of the relevant US studies use the Diagnostic and Statistical Manual of Mental Disorders editions 3 and 4 (DSM-III and DSM-IV) criteria to define alcohol abuse and dependence (De Wit et al 2000; Grant and Dawson 1997; Grant 1998; Hingson et al 2000).[40]

A national US survey across all age groups found that:

- Of those who begin drinking by age 14, rates of lifetime dependence on alcohol are estimated at 40 percent, compared with a 10 percent rate of dependence for those who begin drinking at age 20 or older;

[38] Coate and Grossman (1987) define "frequent drinking" as 4 to 7 times a week. They define "fairly frequent drinking" as 1 to 3 times a week. O'Malley and Wagenaar (1991) and Hingson et al (1985) do not define "frequent". Their approach is to compare levels of frequency across states and years, to observe whether higher frequencies can be found in some situations.

[39] "Liquor" is not defined. It may refer to all alcohol, but it is more likely in the US context to relate to "hard liquor", i.e. spirits.

[40] See Annex 1 for definitions of alcohol abuse and dependence. For further reading, DSM-IV is referenced in this report as APA 1994.

- Of those who begin drinking by age 16, rates of lifetime alcohol abuse are estimated at 11 percent, compared with a 4 percent rate of abuse for those who begin drinking at age 20 or older;
- The odds of dependence decrease by 14 percent with each delayed year of age of onset;
- The odds of abuse decrease by 8 percent with each age-year of delayed onset;
- White people and females are more likely than black people or males to abuse or become dependent upon alcohol if they delay their age of onset (Grant and Dawson 1997).

In Canada, DeWit et al (2000) also found that the age of drinking onset was strongly correlated to potential alcohol dependence and abuse, as outlined in Table 6. Nearly 6,000 people defined as 'lifetime drinkers' were drawn from the 1990/1991 Ontario Mental Health Supplement Survey to participate in the research of DeWit et al.

Table 6: Correlation between Age of Drinking Onset and Potential Alcohol Dependence and Abuse (DeWit et al 2000).

Age at which drinking started	Percentage who met the criteria for diagnosis of alcohol abuse	Percentage who met the criteria for diagnosis of alcohol dependence
11 to 12 years	13.5 percent	16 percent
13 to 14	14 percent	9 percent
19 or older	2 percent	1 percent

Hingson et al (2000) found that among both males and females[41], persons who begin drinking before age 14 years are at least three times more likely to experience diagnosable alcohol dependence during their life than those who did not drink until they are older than 21 years.

In the US, the Department of Health and Human Services tracks admissions and re-admissions to mental health residential facilities for reasons of substance abuse. Analysis of data between 1993 and 1998 shows that 87 percent of alcohol-only admissions reported that they first became intoxicated before age 21. About a third (32 percent) had first become intoxicated by age 14 (SAMHSA 2000). Each study mentioned here supports the theory that early age of drinking onset is more likely to result in adulthood alcohol-related disorders.

6.4 Peer Influence

Grant (1998) found in his US study that among all ethnicity, age and gender subgroups studied, people with a family history of alcoholism had a higher prevalence of lifetime alcohol dependence than did people without such a history. A combination of peer influence, low family interaction and low social skills appear to have the largest effects on teenage alcohol consumption (Smith et al 1989).

Peer encouragement and influence is found to be stronger in the earlier stages of adolescence when alcohol is more likely to be tried (Duncan et al 1994 mentions Kandel 1985). However, De Wit et al (1997) consider that 16 is an age at which many adolescents are afforded a greater

[41] Both with and without a family history of alcoholism.

degree of adult status by their parents and at which the influence of the peer group is felt most strongly in the form of pressures to experiment with the use of drugs and alcohol.

6.5 Mortality

6.5.1 Motor Vehicle Mortality

In the US, Shults et al undertook a systematic review to assess the effectiveness of a number of legal and community-based interventions in reducing alcohol-impaired driving and motor vehicle crash fatalities in the US and other Established Market Economies.[42] Seventy-six studies were included in the review, comprising 55 studies conducted in the US (72 percent of the studies), and studies carried out in Australia, Canada, New Zealand, France, and The Netherlands. The review focused on interventions aimed primarily at reducing alcohol-impaired driving. One priority intervention selected was the minimum legal drinking age. The impact of drinking age laws on alcohol-impaired driving and motor vehicle fatalities is shown in Table 7 (Shults et al 2001).

Table 7: Effects of Changing the Minimum Legal Drinking Age: Summary Effects from the Body of Evidence on Crash Outcomes Likely to Involve Alcohol (Shults et al 2001).

Outcome	Number of Studies	Median Change	Range[a]
Raising the drinking age			
Fatal injury crashes[b]	9	17 percent decrease	30–7 percent decrease
Fatal and nonfatal injury crashes	4	15 percent decrease	33–6 percent decrease
Other crashes	2	Not applicable	21 and 18 percent decrease
Lowering the drinking age			
Fatal injury crashes	3	8 percent increase	2–38 percent increase
Fatal and nonfatal injury crashes	4	5 percent increase	2 percent decrease to 22 percent increase
Other crashes	2	Not applicable	22 and 186 percent increase
Estimated effect of raising the drinking age by 3 years (from 18 to 21) from regression-based studies			
Fatalities and fatal crashes	9	12 percent decrease	17–8 percent decrease

[a] when 7 or more studies were available, an interquartile range is presented.

[b] a study evaluating fatal crashes among 16- and 17-year olds was not included in the summary effect measures

The link between a lower drinking age and increased alcohol-related motor vehicle injuries and fatalities has been the focus of many studies over the years. A large number of these studies find that one effect of lowering the drinking age is an increase in fatal and nonfatal alcohol-related

[42] The World Bank defines Established Market Economies as Andorra, Australia, Austria, Belgium, Bermuda, Canada, Channel Islands, Denmark, Faeroe Islands, Finland, France, Former Federal Republic of Germany, Germany, Gibraltar, Greece, Greenland, Holy See, Iceland, Ireland, Isle of Man, Italy, Japan, Liechtenstein, Luxembourg, Monaco, The Netherlands, New Zealand, Norway, Portugal, San Marino, Spain, St Pierre and Miquelon, Sweden, Switzerland, the United Kingdom, and the Unites States of America.

motor vehicle crashes. For example, a Canadian study examining night-time motor vehicle crashes involving male drivers between January 1968 and June 1973 measured the impact of the lowering of the drinking age in Ontario from 21–18 years in July 1971 on the collision behaviour of young drivers (Whitehead et al 1975).

It found that nighttime crashes involving male drivers:

- increased 34 percent for 16–17 year-olds (equating to a net change of more than 30 percent);
- increased 58 percent for 18 year-olds (equating to a net change of more than 19 percent);
- increased 52 percent for 19 year-olds (equating to a net change of more than 32 percent);
- increased 31 percent for 20 year-olds (equating to a net change of more than 14 percent);
- increased 1 percent for 24 year-olds (equating to a net change of less than 17 percent).

They study also compared the crash rate for the affected age groups with the rate for older drivers and showed that relative to older drivers the affected age groups had experienced large increases in overall crashes since the lowering of the drinking age. This equated to a net change of more than 22 percent in 22 months.

Young drivers more frequently crash at lower blood alcohol concentrations (BAC). Relative crash risk has been shown to increase exponentially with increased BAC. In 1996, 21 percent of male and 11 percent of female US drivers that were involved in a fatal crash had a BAC of 0.1 percent or greater. At 0.1 percent BAC (considered in this study to be about 4 to 5 standard drinks in 1 to 2 hours or about 50 mg),[43] a driver is six times more likely to be involved in a crash compared with a 0 BAC level. At 0 BAC, drivers under the age of 20 have a crash risk that is 1.68 times greater than adult drivers. With a BAC of between 0.05 and 0.09 percent, the risk is increases 4.25 times (Pacific Institute for Research and Evaluation 1999).

The highest risk period for experimental drinking in Canada begins in the mid-teens and peaks by age 19 (De Wit 1997). Risky drinking years coincide with physiological vulnerability. Young drivers found with BAC in the range 0 to 0.04 percent have a 50 percent higher risk of crashing compared with non-drinking drivers.[44] In the range 0.05 to 0.09, their crash risk is more than 150 percent higher compared with non-drinking drivers. Older age groups do not show these sharp increases in crash risk after a couple of drinks (Pacific Institute for Research and Evaluation 1999).

US studies tend to show that raising or lowering the drinking age can have significant impacts on the number of fatal motor vehicle crashes, particularly fatal night-time crashes. The US is an interesting case study in that most states lowered their drinking age in the 1970s, only to raise them again in the late 1970s and early 1980s. The lowering of minimum drinking ages to below 21 years in the 1970s has been described as a reaction to the Vietnam War and consequent pressures to recognise adulthood at an earlier age. Voting rights were extended to 18 year-olds, for example, in 1971. By the mid-1970s, researchers were already producing research findings that questioned the wisdom of lowering the drinking age (United States Accounting Office

[43] In New Zealand and Australia, a 0.1 BAC would equate to about 4 standard drinks over 1 hour for average-sized females, and about 6 to 7 standard drinks over 1 hour for an average-sized male (Northern Territory Government 2000).

[44] 0.04 percent equates to 40mg/100ml of blood.

1987). Because the 21st Amendment to the US Constitution guaranteed the right of US states to regulate alcohol use and production, the Federal Government could not mandate a uniform drinking age (Toomey et al 1996). Instead, in 1984 a Federal law was passed that meant that any state that had not enacted a minimum legal drinking age of 21 years by October 1986 would face the loss of a portion of Federal highway funds from 1987 (O'Malley and Wagenaar 1991; Toomey et al 1996). All states raised their drinking age to 21 years by 1988 (O'Malley and Wagenaar 1991).

Studies mostly estimate that raising the drinking age from 18 years to 20 or 21 years has decreased motor vehicle fatalities for young people by between 5 percent and 28 percent. The most significant effects are found between the 18 and 20 year-old thresholds, with smaller effects found by moving the threshold to age 21 (MacKinnon and Woodward 1986; Holder 1987; Hoskin et al 1986; Du Mouchel et al 1987; Wagenaar 1986; Coate and Grossman 1987; United States Accounting Office 1987 among others).

Two early studies of the effects of lowering the drinking age found that crashes involving young people increased:

- By 7 percent [+ or – 6 percent] (Du Mouchel et al 1987 mentions Cook and Tauchen);
- Between 17 to 35 percent (Wagenaar 1986 mentions Douglas and Freedman 1977).

6.5.2 Price Elasticities and Motor Vehicle Mortality

Some studies indicate that Federal tax increases would reduce crash fatalities more effectively than would raising the drinking age. Coate and Grossman (1987) estimated that:

- A standard drinking age of 21 years could have reduced the number of 18 to 21 year-olds killed in motor vehicle crashes by 8.5 percent over the period 1975 to 1981;
- Inflating alcohol prices annually together with taxing beer at the same rate as spirits (which has had a higher tax rate in the US) would have reduced youth deaths by 54 percent.

6.5.3 Non-Vehicle Mortality

US researchers have debated whether or not lowering the drinking age reduces the number of non-vehicle fatalities. Hingston et al (1985) found the number of non-vehicle fatalities is not affected by changes to the drinking age. Howland et al (1998) found no significant association between drowning and the drinking age for any age group. Yet studies do conclude that the location of drinking changes for teenagers following the raising of the drinking age.[45] This in turn reduces the number of intoxicated young people driving, but as alcohol will still be consumed at home the rates of homicide, suicide and so on might, therefore, remain unchanged or vary only slightly (Hingson et al 1985; Toomey et al 1996).

Birckmayer and Hemenway (1999) estimate that a drinking age of 18 years increases suicide rates by 8 percent for young people aged 18–20 years, and by 6 percent among young people aged 21–23 years (compared to a drinking age of 20 or 21 years). No association is found for

[45] For example, fewer young people drinking in bars.

young people aged 15–17 years. However, one study found that states with a higher drinking age had lower rates of death caused by suicide and pedestrian accidents (Toomey et al 1996 mentions Jones et al 1992).

A UK study found that between 30 and 60 percent of all murders involve alcohol consumption. It also found that a 3 percent fall in per capita alcohol consumption resulted in a 50 percent reduction in drivers killed (Shepherd 1994). This study does not specify these effects by age. The author concluded that raising the minimum purchasing age of alcohol to 21 years, among other interventions, would reduce alcohol-related deaths and injuries.

One Australian study that attempted to isolate the effects of a lowered purchase age on the level of injury sustained by young people found an increase in non-traffic injuries related to the lowering of the purchase age in two Australian states (Toomey et al 1996 mentions Smith 1986).

6.6 Morbidity/Injury

6.6.1 Types of Adverse Event/Injury

US, French, Finnish, Canadian, Australian and UK studies show a significant association between alcohol consumption and adverse events or injuries across the areas of assault, facial injuries, falls, family violence, poisoning, fires and burns, unsafe sex, boating accidents, suicide attempts and injuries in the home, at work, on the street, and during sport (McLeod et al 1999; Maio et al 1994; Treno et al 1997; Zureik and Ducimetiere 1996; Hutchison et al 1998; Honkanen et al 1983; Shepherd 1994; Toomey et al 1996; and Wells and MacDonald 1999 among others). A New Zealand review of international studies (Boot and Treep 1990) concludes that the association between alcohol and various injuries is significant.

A UK study found that 11 percent of falls and 55 percent of all assaults related to alcohol consumption. Twice as many males as females were injured in an alcohol-related incident, while four times as many females as males were assaulted in alcohol-related incidents (Hutchison et al 1998). Another study found that 28 percent of all burns had alcohol abuse as a predisposing factor (Boot and Treep 1990 mentions Brodzka 1985). Boot and Treep (1990) cited US studies showing the associations between alcohol and burns that ranged in their estimates from 17 to 62 percent. Shepherd's study of injuries presented at UK accident and emergency departments found that between 65 and 80 percent of injured people were intoxicated at time of injury (1994).

6.6.2 Injury and Gender

Studies show that young males are more likely than males of other ages or females of any age to sustain injuries while drinking, except in the areas of family violence and suicide attempts (Hutchison et al 1998; McBride et al 2000). Young males between the ages of 14 and 19 appear particularly prone to risky drinking to a level that produces a 3-fold increase in the risk of sustaining an injury (Honkanen et al 1983; McLeod et al 1999). In addition, a UK study found that a male who drank an average of 3 drinks per session 12 times per month increases his likelihood of injury (compared with a non-drinker) by 14 percent (Treno et al 1997).

Young females appear less likely than young males to consume such risky amounts of alcohol in a single session. When they do, however, their probability of injury is higher than that for young

males due to the more intense physiological impact of alcohol on females than on males (Honkanen et al 1983; Shepherd 1994; McLeod et al 1999). [46]

6.7 Unsafe Sexual Contact

Risky youth drinking and early onset of drinking has been linked to patterns of unsafe sexual contact in young people:

- An Australian Adolescent Health Survey conducted at the end of 1992 found that two-thirds of students aged 16 and 17 years consumed alcohol. It also found that 15 percent of those who drank reported either that they had had unsafe sex or that they had regretted having sex while under the influence of alcohol (Bonomo et al 2001).
- A US study found that 60 percent of young females at college who contract a sexually transmitted infection do so while under the influence of alcohol (Coombs 1997 mentions Roan 1994).
- A US study concluded that young binge drinkers are eight times more likely than non-binge drinkers to engage in sexual behaviour with people they would not have had they been sober (Coombs 1997).
- In the UK, a survey of 1,000 young people aged between 14 and 20 years found that alcohol use was associated with sexual initiation at a younger age. The survey also found that, of those who reported that they regretted their first ever sexual intercourse, around one-third attributed the event to the impact of alcohol use (Ingham 2001).

From existing studies, it is not possible to determine whether there is simply a correlation or a direct causal link between adolescent drinking and unsafe sex. It is unclear whether heavier drinkers are less likely to use contraception in general, or only during the sexual encounters that occur when they are consuming alcohol heavily.

6.8 Longer-Term Impacts

Alcohol is linked with longer-term medical impacts/premature deaths. In their French study of alcohol misuse, Zureik and Ducimetiere (1996) found that over 19 percent of male premature deaths and 13 of female premature deaths were attributable to alcohol. A follow-up study found that the average percentage had increased to over 24 percent.[47] Major contributors to the statistics were unintentional injuries for females, and digestive diseases and malignant neoplasms for males.

A 1992 UK study considered the links between head injuries and nervous system impairment and alcohol consumption (Solomon and Malloy 1992). The authors found that about 43 percent of patients with a head injury had a history of alcohol abuse or dependence.

[46] The term 'risky drinking' was defined in Honkanen et al 1983 and McLeod et al 1999 as more than 6 standard drinks or 60 mg of alcohol in one session (Honkanen et al 1983; McLeod et al 1998).

[47] The findings of both studies were reported together the one document (Zureik and Ducimetiere 1996).

7. RISK ASSESSMENT: HEALTH IMPACT ASSESSMENT OF LOWERED PURCHASE AGE

7.1 Application of International Evidence to New Zealand Benchmark Data

Applying overseas evidence to the New Zealand situation has some limitations, which are discussed in more detail in section 4.3 of this report.

Most of the robust studies that demonstrate a causal link between lowering the drinking age and immediate health outcomes for young people are US-based. A smaller number of robust studies are sourced from Australia, the UK, Canada and an even smaller number from Western Europe and Scandinavia.

It is difficult to definitively estimate the health impacts in New Zealand of lowering the purchase age from age 20 to age 18 in 1999 without regression analysis that controls for a range of exogenous factors and without access to more years of post-1999 data. This section applies overseas estimates of possible impacts to the most recent relevant New Zealand data to provide an estimate or a hypothesis of possible per annum impacts.

This section cannot move to a level of detail such as breakdowns by ethnicity or gender, or breakdowns by types of non-traffic injury. Nevertheless, the international studies combined with the New Zealand trend data paint of picture of:

- Young males over-represented in alcohol-related traffic accident statistics together with other morbidity statistics such as suicides and falls;
- Young females most at risk of the outcomes of unsafe sex while under the influence of alcohol, alcohol-related violent assaults, and suicide attempts or self-harm;
- Young Mäori most at risk of being involved in a homicide, suicide, injury from fire, teenage births, mental health disorders associated with alcohol use, and mortality due to a vehicle accident and (longer-term) to alcohol-related conditions;
- Young Pacific people most at risk from injuries resulting from sports, assaults and falls, and deaths resulting from motor vehicle accidents.

First round impacts and costs associated with the lowering of New Zealand's purchase age are estimated below. Some potential longer-term impacts are indicated.

7.2 First Round Health Impacts and Costs

The estimated impacts provided in Table 8 are indicative only. The impacts are estimated as far as possible 'at the margin' (that is, they attempt to relate solely to the lowering of the purchase age from age 20 to age 18 in 1999). Data does not always allow this. The figures given here are moderate estimates. Higher and lower estimates of health impacts and costs are outlined in Annex 3. Annex 4 explains the assumptions that sit behind these estimates. Estimated costs combine any costs to the state (in this case, increased expenditure), costs to individuals (out of pocket expenses), costs to society (ACC costs), and the statistical costs of a life, as applicable.

Table 8: Estimated First Round Health Impacts of Lowering New Zealand's Alcohol Purchase Age: Annual Figures for the Year 2000 Based on Overseas Empirical Evidence, New Zealand Benchmarking Data, and Assumptions Taken at the Median (moderate estimates)[48]

	DEATHS (Year 2000)		MORBIDITY (Year 2000)	
Mode of death/injury	**Number**	**Cost ($m)**	**Number**	**Cost ($m)**
Vehicle Fatalities	12	30.624		
Suicide	4	11.176		
Homicide	0.1	0.140		
Vehicle morbidity or injury			104	1.157–27.759
Suicide attempts/self-harm			19	0.212–5.099
Non-traffic morbidity or injury			21	0.235–5.647
TOTALS	**16**	**41.940**	**144**	**1.604–38.505**

A range of first round impacts have not been estimated such as teenage births, sexually transmitted diseases, abortions, sexual harassment, and mental health are not calculated. This is due to the lack of New Zealand data and the lack of overseas empirical evidence showing rates of possible causal links with alcohol consumption.

7.3 Longer-Term Health Impacts and Costs

A number of alcohol-related adverse events have the potential to affect New Zealand's health status and economy in the longer-term. These include but are not limited to fetal alcohol effects, loss of opportunity due to an earlier age of onset, increased alcohol abuse and dependency associated with an earlier age of onset, and the ongoing costs to society of vehicle injuries and teenage births. These have not been estimated due to insufficient comparative international studies providing causal estimates and a lack of relevant benchmarking data from New Zealand.

8. RISK MANAGEMENT: MOST EFFECTIVE INTERVENTIONS

International and New Zealand studies show some interventions to be more effective than others at reducing the numbers of young people drinking and drinking heavily. The key interventions that have been studied by researchers or recommended by public health and advocacy groups include:

- Price elasticities, particularly with regard to increasing the prices of beer;
- Raising the drinking age or purchase age to at least age 20 years;
- Policing and enforcement of sale of alcohol to underage young people, and drink/drive laws;
- Introducing tougher drink/driving laws for young people (such as lower legal BAC levels);
- Graduated driver licensing, such as the system New Zealand already has in place.

[48] The costs of deaths cannot easily be added to the costs of injuries. Injuries are based on a per annum approach, whereas deaths are based on an across life approach. The costs of death are based are based on Land Transport Safety Authority estimates (2001b). Annex 3 explains these costs.

A number of other initiatives are suggested that may support the above policy interventions.

8.1 Price Elasticities

The price of alcohol (particularly beer) is a key driver of drinking patterns, particularly for young people who are very responsive to price. Available disposable income plays a significant role in drinking frequency. New Zealand already uses the alcohol excise tax and hypothecated tax as means to adjust alcohol prices. These controls are balanced against competition and economic imperatives. However, a further increase in the excise on alcohol would be likely to reduce alcohol consumption and related harm among young people (Zhang and Casswell 1999).

A NZHIS report shows that as alcohol increases in price in New Zealand, less is consumed (New Zealand Health Information Service 2001b). That report cites alcohol price elasticities (the relationship between alcohol prices and consumption) for the years 1984 to 1997.[49] The report controls for the impact of seasonal changes together with the introduction of, and amendments to the Sale of Liquor Act that occurred in 1989. It is estimated that:

- A 10 percent decrease in the real price of wine results in increased wine consumption of 7 percent;
- A 10 percent increase in the real price of beer results in decreased beer consumption of 10.2 percent. Beer is the largest component in New Zealand's alcohol consumption;
- The consumption of spirits appears to be price inelastic (New Zealand Health Information Service 2001b).

Other studies suggest that the frequency and amount of alcohol consumption by young people is highly dependent on levels of disposable income. This indicates that economic factors may play a more significant role in the drinking decisions of young people than policy interventions. It also suggests that increased prices could play a significant role in changing young people's drinking behaviours and consumption-related harm trends.

8.2 Increasing the Purchase Age

Increasing the minimum drinking or purchase age to 20 or 21 has proven to be an effective measure internationally in the reduction of alcohol-related harm for young people. The Federal US Government considered a drinking age of 21 years important enough to put state financial incentives in place designed to encourage states to raise their drinking age. New Zealand has recently (December 1999) lowered its legal alcohol purchase age.

8.3 Policing and Enforcement

Enforcing drinking laws, particularly those relating to access to alcohol, is a key measure for addressing alcohol-relate harm to young people. The tough enforcement of alcohol-related legislation is vital in the regulation of the sale and supply of alcohol, which consequently affects

[49] These were originally estimated by Zhang and Casswell in 1999.

rates of alcohol-related harm. Police and licensing agents were not provided with any additional resources to enforce the purchase age following the introduction of the Sale of Liquor Amendment Act 1999. It is important that they be provided with all of the powers that they need to enforce the legislation fairly, efficiently and effectively.

ALAC and the Police have entered into a memorandum of understanding relating to policing and enforcement of New Zealand's alcohol purchase age subsequent to the implementation of the Sale of Liquor Amendment Act 1999.

8.4 Tougher BAC

Seventeen US states have lowered the legal BAC limit from 0.10 to 0.08 percent. States that have adopted a 0.80 percent law have experienced significant decreases in alcohol-related fatal crashes. Upon enacting 0.08 percent laws, states can expect an average 8 percent decline annually in the proportion of drivers involved in fatal crashes who have positive BAC (Latest approaches to preventing alcohol abuse and alcoholism 2000). New Zealand already has a lower BAC limit in place for drivers under the age of 20 (0.03 percent compared with 0.08 percent for older drivers) (ALAC 1995).

The Road Safety Strategy 2010 Discussion Document (National Road Safety Committee 2000) suggests lowering the legal blood alcohol even further for all motorists. While ALAC does not consider the available evidence to demonstrate the value of reducing blood alcohol levels for all motorists (ALAC 2000b), it acknowledges the effectiveness of a lower level for younger drivers.

8.5 Graduated Driver Licensing

New Zealand's graduated licensing system and the US and New Zealand approaches to lower legal blood alcohol concentrations for younger drivers have been found to be effective measures in reducing alcohol-related harm to young people. New Zealand has been found to have an 8 percent reduction in crashes across the ages 15–19 as a result of graduated licensing (Pacific Institute for Research and Evaluation 1999). This system should be retained as an effective harm minimisation strategy for young people.

8.6 Other Interventions

There are a number of other tools that could be used to support the above initiatives. These include some amendments to the Sale of Liquor Act 1989 and the use of legislative powers other than those provided in the Sale of Liquor Act to reduce alcohol-related harms, such as the gazetting of temporary shelters under the Alcoholism and Drug Addiction Act 1966 to use as a processing centre for young people picked up (drunk or drinking) by police in public places. The establishment and use of such centres could provide social services with the opportunity to intervene in young people's alcohol use where there are currently no such opportunities.

The object of the Sale of Liquor Act is "to establish a reasonable system of control over the sale and supply of liquor to the public with the aim of contributing to the reduction of liquor abuse, so

far as that can be achieved by legislative means" (Sale of Liquor 1990). It was not intended that it be used to enforce 'duty of care' issues around the drinking behaviours and consequent alcohol-related harms experienced by minors or younger legal alcohol purchasers. In support of the Sale of Liquor Act, social legislation could be better utilised to address 'duty of care' issues around parental supply of alcohol to minors for unsupervised use (particularly when this results in harm to the minor).

The public health field in New Zealand has made a number of suggestions for amendments to the Sale of Liquor Act itself, which would facilitate enforcement and a reduction of alcohol-related harm to young people. These include:

- provisions for the mandatory checking of proof-of-age identification for young people;
- changes to the provisions regarding supply to minors to make it illegal for anyone but a minor's parents or legal guardian to supply that minor with alcohol and then only in a setting supervised by the parent or guardian (also removing references to supply to minors at private functions);
- amending the legislation to allow for 'sting' operations to be carried out legally.

Local Government agencies also have a wide range of tools that they can use (regulatory and non-regulatory) to reduce alcohol-related harms among young people. Although regulation may address some of the problems related to youth drinking (including disorder, violence, vandalism, negative impacts on businesses, noise, and a negative civic image), regulation can also contribute to further problems (for example, displacement caused by moving public drinkers on).

In addition, drinking by young people, particularly minors, often raises issues around supply or ease of access to alcohol, boredom or lack of other alcohol-free activities, youth drinking and risk-taking culture, parental awareness and responsibility, and the health of those young people. These are not issues that can be addressed by regulatory measures alone. ALAC acknowledges the need to regulate the drinking of alcohol in public places. However, regulation should only be part of a comprehensive alcohol policy developed by local government bodies in collaboration with the whole community.

It is important that any local government policy surrounding alcohol targets the wider impact of alcohol use and misuse on the community and the issues that lead to misuse in addition to targeting problematic youth drinking within a regulatory framework. A number of councils have already adopted a Sale of Liquor Act Policy, but as issues are wider than those related to the Sale of Liquor Act 1989 it is important that councils develop and adopt a wider alcohol policy. If targeted more widely than Sale of Liquor issues, an alcohol policy can use all of the strategies and tools available to local bodies (such as civic planning, the production of youth events, by-laws, youth or family involvement in Council activities, and community action or development). A local government alcohol policy must be developed with community consultation and all agencies and bodies who will be affected by the policy (for example, the New Zealand Police and public health services).

Public health workers and health promoters also have a range of tools that they can use to reduce alcohol-related harms for young people. These include, but are not limited to, community action and social marketing campaigns. Public health workers and health promoters are already using

many tools toward this aim, and an increase in this area would also require an increase in targeted funding.

It is important to note, however, that initiatives implemented by local government and health workers are not a substitute for robust centralised alcohol policies, and should be used to support strong policy interventions rather than to replace them.

9. GAPS IN BENCHMARKING DATA: WHERE TO NEXT

9.1 An Alcohol Indicator Required on National Data

In most cases other than vehicle fatality and injury data, the data associating alcohol and adverse outcomes is not always collected or involves patchy collection. The relationship between alcohol and injury may not always be established if there is a time delay between the injury occurring and medical attention being sought. Where an injured person is violent or abusive, it may not always be practicable to request a test for alcohol. Even if requested, injured parties are within their legal rights if the decline to be tested.[50] Some data relies on a subjective assessment of whether or not the injured party has been drinking. It is for this reason that US studies of the link between alcohol consumption and vehicle crashes tend to focus on fatal crashes, as the US requires a blood-alcohol test to be undertaken for all fatal vehicle accident victims (but not injured people).

A standard alcohol indicator on national morbidity and mortality data would make alcohol-related adverse events (including internal health conditions, injuries, and fatalities) easier to identify, analyse and target by policy makers and health workers alike.

9.2 More Thorough Collection of New Zealand Benchmarking Data Required

This study of the health impacts of the lowered purchase age has identified a lack of benchmarking/trend data for young people, particularly in the areas of fetal alcohol syndrome, alcohol-related mental health disorders (particularly those involving non-residential treatment), and sexual harassment.

In New Zealand, only 4 doctors are specialised in diagnosing fetal alcohol syndrome and fetal alcohol effects. A specific and specialised diagnosis is critical for identifying these conditions. It is estimated that there are a large number of children in New Zealand with undiagnosed fetal alcohol syndrome or fetal alcohol effects. Once recent Massey University research project into pregnancy shows 40 percent of all females continued to drink in pregnancy and about 11 percent were heavy drinkers. Over 60 percent of pregnant teenagers were drinking during pregnancy (Mathew et al 2001). This is the most substantial information we have to date. All other estimates are based on primarily North American research.

[50] This differs for New Zealand drivers who are legally required to submit to breath or blood tests for alcohol.

The Ministry of Health has recently introduced a mental health tracking survey to collate mental health service admission data. At the time of writing this report, the Ministry of Health uncertain whether or not alcohol and drug related health issues would be included in the tracking survey or whether non-residential treatment services will be included.

A thorough collection system for New Zealand health data is long overdue. In October 2001, a report on the WAVE Project ('Working to Add Value through E-information') made a number of recommendations on ways to address of strategic information planning needs in the health sector and encouraged better ways of recording, sharing, analysing and using health data (WAVE Advisory Board 2001). Most of these recommendations have yet to be put into place. The implementation of that document's recommendations would provide a good basis for more thorough data collection and more accessible data sets.

9.3 Further Study of the Links between Alcohol Use, Sexual Assault and Harassment Required

Much of the research about the links between alcohol use and sexual assault/harassment discusses the alcohol consumption of the harassment or assault victims rather than perpetrators. Research has tended to focus on the potential for consumption by females to increase subsequent to a rape or sexual assault and on the increased vulnerability or lowered ability of females to resist attack when drinking alcohol (Trauma Foundation 1998).

The link between alcohol and sexual harassment has not been studied as closely as the link between alcohol and sexual assault, but there are a still a number of high quality studies focusing on the link between sexual harassment and alcohol. There is evidence that alcohol and other drug use exacerbates problems with misinterpretation of sexual intent and is sometimes used to justify assault (Higher Education Center 2001). One US study found that most college men believed that females who consume two or more drinks are more interested in having sex than other females. The college men studied also believed alcohol to increase sexual arousal and to legitimate non-consensual aggression (Higher Education Center 2001).[51]

Trend data for sexual harassment is not easily accessible. Trend data linking sexual harassment with alcohol is particularly difficult to obtain. Most sexual harassment data that are collated are work place related, and it is unclear how much of these data can be linked to alcohol use.

The links between alcohol-use and sexual harassment need to be more fully explored in the New Zealand context. In addition, research into the links between alcohol use and the perpetration of sexual assault (alcohol use in the perpetrators rather than the victims) would add real value to our understanding of some key adverse alcohol-related behaviours and could provide a basis for interventions.

[51] The Higher Education Centre study (2001) refers to a study by Abbey (1991) on the links between acquaintance rape and alcohol consumption on college campuses.

6.4 Improved Collection of Ethnicity Data Required

There are few ethnicity data available in relation to alcohol use and health outcomes, particularly relating to Pacific peoples. Although some organisations make the collection of ethnicity data standard practice, others have yet to learn that the collation and analysis of ethnicity data is an important step toward interventions appropriate to specific ethnicities. All organisations must be encouraged to collect ethnicity data and to ensure that ethnicity samples in research are great enough to be statistically significant where possible.

6.5 Further Identification of Gaps in Alcohol-Related Data Required

Peter Watson is currently undertaking work for ALAC to identify gaps in alcohol-related health data and consider ways to encourage other organisations to collect necessary data. This work will take at least two years to complete. However, identification of the gaps is not enough. A commitment is required by data collection agencies to ensure that these gaps are filled and that the relevant data is accessible to researchers, policy-makers and other interested parties in a timely manner.

10. CONCLUSION

This report finds a significant amount of New Zealand benchmarking data in relation to adverse outcomes for young people and (in some cases) their association with alcohol use. It is also clear that trend data is lacking in some areas.

The report identifies a lack of multivariate studies in New Zealand establishing links between alcohol-related policy settings and outcomes. Additionally, New Zealand benchmarking trend data in relation to health outcomes is not always available or up to date. The lack of a standard alcohol indicator on national morbidity and mortality data compounds this problem.

Where trend data are available that record alcohol use and negative outcomes, it must be recognised that these can offer insights into possible causal relationships but cannot demonstrate them. Therefore, it was necessary to apply overseas evidence to the New Zealand data to estimate the health impacts of lowering the age at which people can legally purchase alcohol. The appropriateness of applying overseas studies to New Zealand situations has been considered, and enough similarities have been found to reassure ALAC that this is an appropriate use of international data.

The application of overseas empirical evidence of causal links between the drinking age and outcomes to New Zealand benchmarking data yields an estimate that 16 young people aged 18 and 19 years may have died per annum due to the lowered alcohol purchase age in New Zealand (at a cost of $41.940 million per annum).

In addition, it is estimated (based on overseas studies) that the lowered purchase age may have contributed an additional 145 non-fatal adverse outcomes (including injuries and self-harm) to the alcohol-related harm statistics for young people (at a cost of between $1.604 million and $38.505 million, depending on the severity of the injuries).

A range of impacts are not estimated in this report due to a lack of relevant New Zealand data, including some first round effects and longer-term health and economic effects.

A range of policy interventions in addition to drinking or purchase age policies can impact on the drinking patterns and health impacts of young people. International researchers, public health and advocacy groups recommend some evidence-based interventions, but there are a number of other interventions that could be attempted in the New Zealand policy setting. The key interventions that have been studied by researchers or recommended by public health and advocacy groups include price elasticities, a drinking age or purchase age to at least age 20 years, policing and enforcement of drink-drive laws and alcohol sales to minors, tougher drink-drive laws for young people, and graduated driver licensing.

New Zealand already uses a number of these interventions, but some of them leave considerable room for movement. There are a number of other tools that could be used to support the key policy initiatives, but initiatives implemented by local government and health workers should support robust centralised alcohol policies and cannot be effective in isolation.

ANNEX 1: DEFINITIONS OF ALCOHOL ABUSE AND ALCOHOL DEPENDENCE

Definitions of alcohol abuse and alcohol dependence used in this study were sourced from the *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV* (APA 1994).

Alcohol Abuse

Alcohol abuse is mutually exclusive of alcohol dependence. Alcohol abuse is defined as a maladaptive pattern of alcohol use leading to clinically significant impairment or distress, as manifested by one (or more) of the following occurring within a 12-month period:

1. Recurrent alcohol use resulting in a failure to fulfil major role obligations at work, school, or home.
2. Recurrent alcohol use in situations in which it is physically hazardous.
3. Recurrent alcohol-related legal problems.
4. Continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the alcohol.

Alcohol Dependence

Alcohol dependence is mutually exclusive of alcohol abuse. Alcohol dependence is defined as a maladaptive pattern of alcohol use leading to clinically significant impairment or distress, as manifested by three (or more) of the following occurring at any tome in the same 12-month period:

1. Tolerance, as defined by either of the following:

a) A need for markedly increased amounts of alcohol to achieve intoxication or desired effect

b) Markedly diminished effect with continued use of the same amount of alcohol

2. Withdrawal, as manifested by either of the following:

a) The characteristic withdrawal syndrome for alcohol

b) Alcohol is taken to relieve or avoid withdrawal symptoms

3. Alcohol is often taken in larger amounts or over a longer period than was intended
4. There is a persistent desire or unsuccessful efforts to cut down or control alcohol use
5. A great deal of time is spent in activities necessary to obtain alcohol, use alcohol, or recover from its effects
6. Important social, occupational, or recreational activities are given up or reduced because of alcohol use
7. Alcohol use is continued despite knowledge of having a persistent of recurrent physical or psychological problems that is likely to have been caused or exacerbated by alcohol.

ANNEX 2: DEMOGRAPHIC PROFILE OF YOUNG DRINKERS

This section draws on data from the annual *Youth and Alcohol Drinking Monitors*, carried out by the Business Research Centre (BRC) (Kalafatelis 2000a and 2000b; Kalafatelis and Edgar 1997; Kalafatelis and Fryer 2001; Edgar and Kalafatelis 1998; De Bonnaire et al 2000; Dowden et al 2000).

It also draws on inter-year comparisons undertaken by BRC in 2001 that identify any changes in young people's consumption behaviours during the period of legislative change (BRC 2001).

Overview

The Youth and Alcohol Drinking Monitors survey young people aged 14–18 years. Most of the data for the purposes of this report has been disaggregated to allow analysis of the 14–17 year old age group. This profile shows how prevalent drinking is among young people under the minimum legal purchase age of 20 (until 1999) and 18 (after 1999).

Figure 6: 1997 Prevalence of Drinking Among 14 - 17 Year-Olds

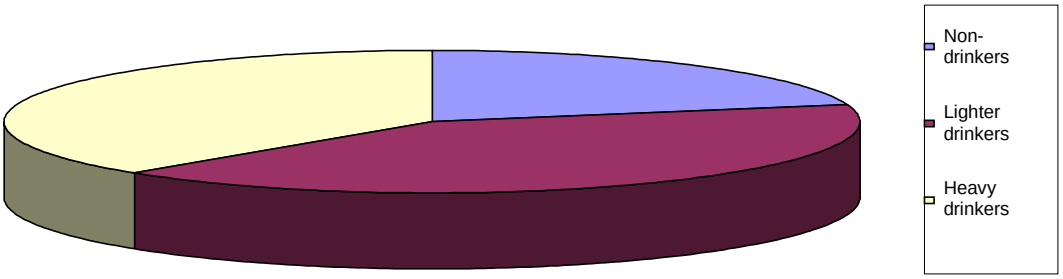
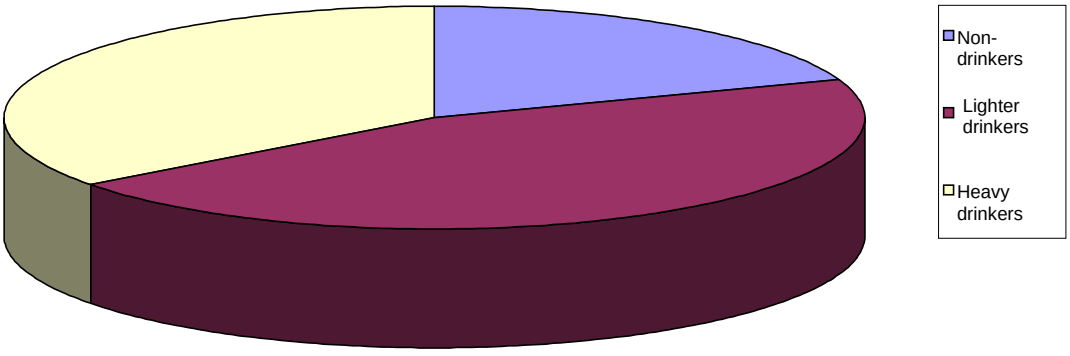


Figure 7: 2001 Prevalence of Drinking Among 14 - 17 Year-Olds



There are fewer non-drinkers in 2001 compared with 1999 as a proportion of young people aged 14–17 years as shown in figures 6 and 7. The proportion of heavier drinkers appears to have remained about the same, while the proportion of lighter drinkers has increased.

Non-Drinkers

- **Age**. In 1998, young non-drinkers were distributed across the age range with about one-third aged 14, about one-quarter each aged 15 and 16, and only 10 percent aged 17. This distribution has changed in 2001 showing that over a half of all non-drinkers are aged 14, less than 20 percent aged 15, only 5 percent aged 16, and increasing to nearly one-quarter for those aged 17.
- **Ethnicity and gender**. In 1998 non-drinkers were more likely to be female (58 percent). This has fallen to 50 percent in 2001. The proportion of non-drinkers who identify as European has fallen from 84 percent in 2000 to 60 percent in 2001. The proportion of non-drinkers that identify as Mäori has fluctuated from just under 20 percent in 1999 to 28 percent in 2000, dropping to 14 percent in 2001. The proportions identifying as "Pacific Island" and "other" has increased.
- **Employment and Study**. Between 93 and 96 percent are studying (2001 and 1999 respectively). Only 2 percent are working, with a further 2 percent unemployed or between jobs.
- **Other**. About 4 percent also smoke, 23 percent drive, and 16 percent have more than $50 per week in disposable money.

Lighter Drinkers

Defined as drinking 1 to 4 glasses on last drinking occasion (Kalafatelis and Edgar 1997; Kalafatelis 2000a and 2000b; Kalafatelis and Fryer 2001; Edgar and Kalafatelis 1998; De Bonnaire et al 2000; Dowden et al 2000).

- **Age**. The distribution of lighter drinkers by age has changed from one of a fairly equal distribution across ages to one where ages 14 and 17 drop to below 20 percent of the total of lighter drinkers, while ages 15 and 16 increase their share to over 30 percent each.
- **Ethnicity and gender**. Lighter drinkers are almost equally likely to be male and female. Lighter drinkers identifying as European fluctuates slightly around the 90 percent mark. Those identifying as Mäori has fluctuated from 16 percent (1999), to 13 percent (2000) increasing to 21 percent in 2001. "Pacific Island" and "other" proportions have remained relatively small and static across the years captured.
- **Employment and Study**. Between 88 and 92 percent study and about 3 percent are between jobs. In 2001, about 5 percent have a full-time job, while 50 percent have a part-time job.
- **Other**. About 14 percent of light drinkers also smoke (reducing from 24 percent in 2000), about a half drive, and one-third has weekly disposable income of over $50.

Heavier Drinkers

ALAC considers the consumption of five or more glasses (of an alcoholic beverage) on one drinking occasion as risky drinking, which is harmful or hazardous. While there are no universally accepted definitions of heavy or risky drinking, this definition is consistent with many definitions used internationally in alcohol-related research (Kalafatelis and Edgar 1997; Kalafatelis 2000a and 2000b; Kalafatelis and Fryer 2001; Edgar and Kalafatelis 1998; De Bonnaire et al 2000; Dowden et al 2000).

- **Age**. Heavier drinkers distribute along the age range with about 15 percent aged 14 and nearly 40 percent aged 17.
- **Ethnicity and gender**. Heavier drinkers are more likely to be male (54 percent in 2001; 58 percent in 1999). Over one-quarter of heavier drinkers identify as Mäori (down from 30 percent in 1999), while over 80 percent identify as European. "Pacific Island" and "other" proportions have remained relatively small and static across the years captured.
- **Employment and Study**. Between 78 percent (1999) and 85 percent (2001) study. About 12 percent have a full-time job, with a further 50 percent in part-time employment. A further small percentage is between jobs.
- **Other**. Forty percent of heavy drinkers also smoke, 55 percent drive, and over 50 percent have weekly disposable income of over $50.

ANNEX 3: RANGE OF ESTIMATED IMPACTS AND COSTS

This annex provides a range of estimated impact and cost estimates from the most to the least conservative. Figures are based on overseas empirical evidence, New Zealand benchmarking data, and assumptions using either the lowest, highest, or median figures available. The assumptions on which these impact and cost estimates are based are outlined in Annex 4 of this report.

The lowest estimates (Table A) use the lowest figures available for the health impacts of alcohol-related vehicle fatalities, non-fatal vehicle injuries, homicide and non-traffic morbidity where possible. Likewise, the highest estimates (Table C) use the highest available figures for those same factors. There is no additional evidence at this stage that can be used to derive a low or high end of the range for suicides or self-harm. The moderate estimates are not driven from their own assumptions. They merely use figures that are the equivalent of half the difference between the lowest and highest estimates in the range.

ALAC has used the moderate estimate in the body of this report, as this is felt to be the most reliable estimate. If the lowest estimate is used, it will not take homicide into account and will likely significantly underestimate other health impacts. Conversely, the highest estimate takes some figures into account that may not be robust, including the highest estimate for vehicle-related injuries or deaths relating to the drinking age (35 percent) and the highest estimate of non-traffic morbidity relating to alcohol (62 percent).

Table A: Lowest Estimates:

Estimated first round health impacts of lowering New Zealand's alcohol purchase age: Annual figures for the year 2000 based on overseas empirical evidence, New Zealand benchmarking data, and assumptions using the lowest figures available

	DEATHS (Year 2000)		**MORBIDITY (Year 2000)**	
Mode of death/injury	**Number**	**Cost ($m)**	**Number**	**Cost ($m)**
Vehicle Fatalities	1	13.062		
Suicide	4	1.176		
Homicide	0	—		
Vehicle morbidity or injury			10	0.116–2.776
Suicide attempts/self-harm			19	0.212–5.099
Non-traffic morbidity or injury			6	0.071–1.702
TOTALS	**6**	**14.238**	**36**	**0.399–9.577**

Table B: Moderate Estimates

Estimated first round health impacts of lowering New Zealand's alcohol purchase age: Annual figures for the year 2000 based on overseas empirical evidence, New Zealand benchmarking data, and assumptions taken at the median.

	DEATHS (Year 2000)		MORBIDITY (Year 2000)	
Mode of death/injury	**Number**	**Cost ($m)**	**Number**	**Cost ($m)**
Vehicle Fatalities	12	30.624		
Suicide	4	11.176		
Homicide	0.1	0.140		
Vehicle morbidity or injury			104	1.157–27.759
Suicide attempts/self-harm			19	0.212–5.099
Non-traffic morbidity or injury			21	0.235–5.647
TOTALS	**16**	**41.940**	**144**	**1.604–38.505**

Table C: High Estimates

Estimated first round health impacts of lowering New Zealand's alcohol purchase age: Annual figures for the year 2000 based on overseas empirical evidence, New Zealand benchmarking data, and assumptions taken at the median.

	DEATHS (Year 2000)		MORBIDITY (Year 2000)	
Mode of death/injury	**Number**	**Cost ($m)**	**Number**	**Cost ($m)**
Vehicle Fatalities	23	58.186		
Suicide	4	11.176		
Homicide	0.1	0.28		
Vehicle morbidity or injury			198	2.198–52.742
Suicide attempts/self-harm			19	0.212–5.099
Non-traffic morbidity or injury			36	0.400–9.593
TOTALS	**27**	**69.642**	**253**	**2.810–67.434**

ANNEX 4: ASSUMPTIONS DRIVING THE IMPACTS AND COST ESTIMATES

First Round Impacts and Costs	Assumptions and Data
VEHICLE FATALITIES	**Numbers:** ❑ In the year 2000, 60 drivers aged 15 to 19 were killed in vehicle crashes (LTSA 2000). **Evidence:** ❑ International studies show an increase in crashes (not just fatalities) for young people[52] of between 2 percent and 38 percent if a drinking age of 20 or 21 years is **decreased** to 18 years (Du Mouchel et al 1987; Wagenaar 1986; Shults et al 2001). ❑ International studies also estimate a 5 to 33 percent decrease in motor vehicle fatalities if a drinking age of 18 years is **raised** to 20 years. (References include MacKinnon and Woodward 1986; Holder HD 1987; Hoskin et al 1986; Du Mouchel et al 1987; Wagenaar 1986, Coate and Grossman 1987, and United States Accounting Office 1987 among others). ❑ The results from the raising of the age are the same order of magnitude as the results from decreasing the age. **Range:** ❑ *Low end of range*. If we take a conservative approach and assume that 2 percent of the figure of 60 fatalities is directly related to New Zealand reducing its purchase age of 20 years to 18 years in 1999, this equates to about 1 fatality. ❑ The *high end of range* is the 38 percent figure, which equates to about 23 fatalities in the New Zealand situation. ❑ The costs relate to some of the social costs per fatal injury estimated by LTSA in June 2001 (Land Transport Safety Authority 2001b). Page 2 of that document includes a statistical estimate of the value of a life loss ($2.547 million) and average medical costs ($5,100 or $0.005 million). Costs associated with legal and court matters and property damage are also estimated in the study but are not included here. **Midpoint Estimate:** ❑ A midpoint estimate is used that lies between the low and high ends of the possible range of motor fatality impacts. The midpoint is 12 fatalities.

[52] Sometimes defined as ages 18 and 19, and sometimes defined as ages 15 to 20.

VEHICLE MORBIDITY OR INJURY	**Numbers:** ❑ New Zealand Health Information Service (NZHIS) statistics (New Zealand Health Information Service 2001c), show 739 vehicle-related injuries in the year 2000 among 18 and 19 year olds. **Evidence and Range:** ❑ *Low end of range*. Taking a conservative approach (using the same approach as above for fatalities) and assuming that 2 percent of these crashes are directly related to the lowered purchase age in New Zealand, this equates to 10 injuries. ❑ The *high end of the range* results in an estimated 198 injuries. ❑ The cost estimates included in the calculations for this report were based on the per injury range of costs estimated by the LTSA excluding legal, court and property damage costs) for minor injuries ($11,000) and for serious injuries ($266,400) (Land Transport Safety Authority 2001b). **Midpoint Estimate:** ❑ A midpoint estimate is used that lies between the low and high ends of the possible range of motor fatality impacts. The midpoint is 104 injuries.
SUICIDE	**Numbers:** ❑ Number of suicide for 15 to 24 year-olds in 1999 (no figure for 2000) was 119 (New Zealand Health Information Service 2001d). IPRU has estimated that 15-19 year-olds contribute about 46 percent of suicides to those carried out by the 15-24 year-old age group (1997) = 55 suicides. **Evidence:** ❑ International evidence shows an 8 percent increase in the number of suicide for 18 and 19 year olds due to a drop in the drinking age from 20 to 18 years (Birckmayer and Hemenway 1999). **Estimate:** ❑ This equates to 4 suicides in New Zealand, which may relate to the lowered purchase age. This approach (extrapolated from Birckmayer and Hemenway's evidence for 18 and 19 year olds) may over-estimate the number of suicides for the purposes of this study simply because we do not have up-to-date suicide data for 18 and 19 year olds on their own (Birckmayer and Hemenway 1999). ❑ The costs relate to the costs of a statistical life and associated medical costs (Land Transport Safety Authority 2001b).
SUICIDE ATTEMPTS/ **SELF HARM**	Numbers: ❑ The total number of suicide and suicide attempts/self harm for young people aged 18 and 19 in 2000 (trend data from New Zealand Health

	Information Service 2001c) is 294. To isolate the suicide attempts from suicides, we exclude an estimated 55 suicides (see above)[53], to give us 239. The estimate of 55 suicides may over-estimate the number of suicides related to the lowered purchase age. Taking this figure away from the total number of suicides and suicide attempts/self harm for ages 18 and 19 may result in an <u>under-estimate</u> of the number of suicide attempts/self harm. Evidence and Estimate: ❑ Using the same 8 percent as above (Birckmayer and Hemenway 1999), this equates to 19 suicide attempts/self harm. ❑ Costs are derived from the per injury range of costs estimated by the LTSA excluding legal, court and property damage costs) for minor injuries ($11,000) and for serious injuries ($266,400) (Land Transport Safety Authority 2001b).
SUICIDE ATTEMPTS/ **SELF HARM**	Numbers: ❑ Total numbers of suicide and suicide attempts/self harm for young people aged 18 and 19 in 2000 (trend data from New Zealand Health Information Service 2001c) is 294. To isolate the suicide attempts from suicides, we exclude an estimated 55 suicides (see above)[54], to give us 239. The estimate of 55 suicides may over-estimate the number of suicides related to the lowered purchase age. Taking this figure away from the total number of suicides and suicide attempts/self harm for ages 18 and 19 may result in an <u>under-estimate</u> of the number of suicide attempts/self harm. Evidence and Estimate: ❑ Using the same 8 percent as above (Birckmayer and Hemenway 1999), this equates to 19 suicide attempts/self harm. ❑ Costs are derived from the per injury range of costs estimated by the LTSA excluding legal, court and property damage costs) for minor injuries ($11,000) and for serious injuries ($266,400) (Land Transport Safety Authority 2001b).
HOMICIDE	Numbers: ❑ Ten young people aged 15 to 24 were involved in a homicide in 1997 (New Zealand Health Information Service 2001a). Later statistics are not available. (NZHIS trend data shows 399 homicides and purposeful injuries of others that involved 18 and 19 year-olds in 2000. New Zealand Health Information Service 2001c) ❑ The NZHIS publication on drug statistics shows that 10 percent of external deaths involve alcohol (New Zealand Health Information Service 2001b). Evidence: ❑ International studies show that a drinking age of 21 years reduced "fairly frequent" drinking by young drinkers by 11 percent, and

[53] Although this was for the 1999 year.

[54] Although this was for the 1999 year.

	"frequent" drinking by between 3 and 28 percent (Coate and Grossman 1988; Hingson et al 1985; O'Malley and Wagenaar 1991). Estimate: ❑ If we assume that 11 percent frequency equates to an 11 percent increase in the percentage of homicides that involve alcohol, we have the equation [10*10 percent*11 percent=0.1]. This assumption is possibly a significant overestimate of effects, and the result is 0.1 life. ❑ Costs include the statistical costs of life and associated medical costs (Land Transport Safety Authority 2001b).
NON-TRAFFIC MORBIDITY OR INJURY (falls, fire-related injuries, poisoning, and water transport)	Numbers: ❑ NZHIS trend data shows that there were 528 non-vehicle injuries in 2000 to 18 and 19 year olds (excluding self-harm and purposeful injury of others) (New Zealand Health Information Service 2001c). Evidence: ❑ A UK study found that 11 percent of falls are associated with alcohol consumption (Hutchinson et al 1998), as are 55 percent of assaults. ❑ **Boot and Treep's 1990 literature review of relevant studies found that alcohol use is discovered in up to 62 percent of all fire-related injuries.** ❑ International studies show that a drinking age of 21 years reduced "fairly frequent" drinking by young drinkers by 11 percent, and "frequent" drinking by between 3 and 28 percent (Coate and Grossman 1988; Hingson et al 1985; O'Malley and Wagenaar 1991). Using the 11 percent assumption in this equation probably yields a significant overestimate of effects. Range: ❑ ***Low end of range***. **Use of the more conservative UK estimate yields an estimate in New Zealand of 6 injuries.** ❑ **At the *high end of the range*, however, an estimate of 36 injuries is the result.** Midpoint Estimate: • The midpoint estimate lying between the low and high ends of the range is 21 non-traffic injuries. • The cost estimates included in the calculations for this report were based on the per injury range of costs estimated by the LTSA excluding legal, court and property damage costs) for minor injuries ($11,000) and for serious injuries ($266,400) (Land Transport Safety Authority 2001b).

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